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Review Article

BREATHING TROUBLE- ASTHMA

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ABSTRACT

Asthma is an immune inflammatory disease that needs prolonged treatment. Each patient is supposed to know the course of the disease and the method of its management. Several factors such aerosols, allergens, drugs, chemicals, exercise, cold dry air, infections and emotions can aggravate the symptoms and precipitate attacks. The incidence of asthma is increasing especially in children especially in developing countries like India. The basic therapeutic principle for this disease dictates that treatment should be based on working diagnosis followed by therapy required so as to reduce the severity of asthma.

Key words: Asthma, Pathophysiology, Inhaled steroid, Selective agonist, Methyl Xanthine.

INTRODUCTION

Asthma is characterized by widespread of peripheral airways in the lungs. It is varying in severity over short periods of time, either spontaneously or as a result of the treatment. Clinically it can be described as a symptom complex of breathlessness wheeze and/or chest tightness[1]. Specific symptoms include

- Prominent night time symptoms
- Early morning symptoms
- Bronchial irritability to a variety of non-specific bronchoconstrictor stimuli (eg. Exercise, change in temperature of inhaled air, smoke, fumes, perfumes, paint).

Hence asthma is a heterogeneous syndrome whose natural history is characterized by the variability in its symptoms and signs over time[2].

Table.1.List of factors causing Asthma

Viral infections	Aspirin	Exercise
Environmental pollutants	β-adrenergic receptor antagonist	Emotional stress
Ozone	Dyes in food and medicine	Immunogenic factors
Nitrogen dioxide	Occupational factors	
Pharmacologic stimuli	Metal salts	

Pathophysiology

The fundamental Pathophysiological abnormality is bronchial hyperreactivity, increased airways responsiveness to any bronchoconstrictor stimuli including inhalation of non-isotonic solutions, allergens and chemicals like histamine, methacholine and PGs[3]. Inhalation of allergens (eg. Pollen, house dust mite) produces an early immediate bronchoconstrictor response in sensitized asthmatic subjects. In 50% of such subjects, allergen induces a dual response with an early reaction and late response.

Late response means onset about eight hours after exposure. Pathologically, asthma is a chronic inflammatory disease of the airways. Mild clinical disease may be accompanied by pathological changes like airway constriction, mucus hypersecretion. A chronic inflammatory infiltrate is apparent, comprising neutrophil and eosinophil, leucocytes and lymphocytes, all of which may play a pathogenic role.

Pharmacotherapy of asthma

A list of drugs used in pharmacotherapy of asthma is given in Table 2.

Table.2. List of drugs in pharmacotherapy of Asthma

Drug type	Example	Use
Daily Medications for long term control • Inhaled corticosteroids • Systemic corticosteroids	Beclomethasone Betamethasone	First line treatment Used to gain prompt control when initiating long term inhaled corticosteroid
Mast cell stabilizers	Cromolyn	May be initial choice in children. Also used as prevention before exercise or allergen exposure
Long acting β_2 receptor agonist	Salmeterol	Given concomitantly with anti-inflammatory agents Not used for acute symptoms
Methyl Xanthines	Theophylline	Adjunct to inhaled corticosteroids
Anticholinergic	Ipratropium	Additive benefit to inhaled β_2 receptor agonist in severe exacerbations

Anti Asthma drugs

Commonly used anti-asthma drugs include Sodium cromoglycate, Prednisolone, Salbutamol, Theophylline and Ipratropium Bromide.

Sodium cromoglycate

Sodium cromoglycate is inhaled either as a finely divided powder using an insufflator or as an aerosol[5]. The mechanism of action may involve suppression of the release of mediators from sensitized mast cells. It is of no value when administered after stimulus to release but is useful when given 30 minutes before exercise to prevent bronchoconstriction.

Anti-inflammatory

Glucocorticoids

Oral prednisolone or inhaled glucocorticoids (eg. Beclomethasone) provide very effective asthma prophylaxis[6]. Oral glucocorticoids are particularly prone to produce serious systemic adverse effects on prolonged treatment. Cushing's

syndrome includes symptoms like hyperglycemia, salt and water retention, increased susceptibility to infection, muscle wasting andosteoporosis. Oral glucocorticoids are largely avoided by use of inhaled glucocorticosteroids.

Selective agonists at $\beta_2$adrenoreceptors

Salbutamol and terbutaline are relaxants of airways smooth muscle than are more effective against early, rather than late phase of airway narrowing in an attack of asthma[7]. Since salmeterol has an airway $t_{1/2}$ of 12 hours, it is a useful prophylactic agent when used once daily.

Methyl Xanthines

Theophylline is a sustained release formulation and may be given once or twice daily. Absorption and metabolism vary with age, smoking and dietary habits, with concomitant liver and heart disease and in presence of other therapeutic agents (eg. Ciprofloxacin)[8]. Since therapeutic window is 5-15 mg/L, plasma or saliva assay is advisable to develop a dosage regimen.

Anticholinergic Drugs

Ipratropium Bromide (atropine analogue) inhibits bronchoconstricting effects of vagus nerve activity and reduces bronchial mucous secretion[9]. Since inhaled as an aerosol, it has a local action with delayed onset (30-60 min) of action.

CONCLUSION

Regular treatment with inhaled corticosteroids for patients with mildly persistant asthma provides control of asthma, suppresses airway inflammation. Hence progression of asthma is prevented. When dose of inhaled corticosteroids is doubled, it is found to be ineffective in preventing exacerbation of asthma. High dose inhaled corticosteroids administered at the onset of exacerbation increase the control of asthma[10]. Potential adverse effects associated with them such as oropharyngeal candidiasis, suppression of hypothalamic pituitary adrenal axis, bone resportion restricted their use. This indicated awareness among prescribers[11]. However, inhalation route causes a high local concentration in the lungs with low systemic delivery, thereby significantly improving the

therapeutic ratio and minimizing systemic side effects[12]. The goal of therapy is to relieve symptoms and to prevent recurrence of asthmatic attacks.

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