Update Article

Best Treatment Guidelines For Bronchial Asthma

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Abstract

Asthma is a common disease worldwide with significant ethnic and regional variations. An increasing morbidity and mortality, as well as health care burden from asthma have been recognized lately. Several evidence based guidelines have been developed with an aim to standardize and improve the quality of management. These guidelines seek to translate the advances in the understanding of pathogenesis of asthma and in the development of new agents and strategies into practical application at all levels of healthcare. These advocate an assessment of the patients to classify the severity of diseases followed by a step-wise approach to treatment. With the current management we hope to achieve minimum or nil day time and night time symptoms, prevent acute exacerbations and attain normal or near normal lung function, thus improving the overall quality of life.

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Introduction

Numerous evidence based guidelines for diagnosis and management of bronchial asthma are available throughout the world [1-3], because of the differences in the health care infrastructure, risk factors, disease pattern and prevalence. The Indian guidelines for bronchial asthma are discussed.

Definition

Bronchial asthma is a chronic inflammatory disorder of the airways associated with airway hyper responsiveness that leads to recurrent episodes of wheezing, breathlessness, chest tightness and coughing particularly at night or in the early morning. These episodes are usually associated with widespread but variable airflow obstruction that is often reversible either spontaneously or with treatment.

Incidence

The prevalence of asthma worldwide is around 200 million with a mortality of around 0.2 million per year. The estimated burden of asthma in India is more than 15 million. The population prevalence of asthma reported in different field studies and specific population group is reported to be variable [4,5].

Onset of asthma can occur at any age, but children and young adults are commonly affected. Although asthma can not be cured, clinical episode can be prevented and controlled by proper management. The exact cause of asthma is not known. There are a variety of host and the environmental risk factors.The host factors are genetic predisposition, atopy [5], airway hyper responsiveness, gender and race/ethnicity. The environmental risk factors are indoor and outdoor allergens, occupational sensitizers, tobacco smoke and air pollution [5-7], respiratory infections, parasitic infections, socio economic factors, family size, diet, drugs and obesity.

Diagnosis

Careful history should be taken of isolated wheeze, wheeze with dyspnoea, exercise dyspnoea, wheezing in absence of cold, nocturnal chest tightness, nocturnal cough, nocturnal dyspnoea, chronic phlegm production and chronic cough. The important physical findings are wheezing, hyper inflated chest, tachypnea, tachycardia, use of accessory muscles of respiration, cyanosis, drowsiness and allergic rhinitis or sinusitis.

In the differential diagnosis, always think whether the obstruction is localized or generalized? If generalized, differentiate asthma from chronic obstructive pulmonary disease (COPD) and left ventricular failure (Table 1). Localized obstruction may be due to tumour, foreign body, aspergillosis, mediastinal lymphadenopathy or laryngeal nerve palsy.

The diagnosis of asthma in any patient can be viewed as a two step approach (Fig.1). The first step includes clinical suspicion of the diagnosis and attempts to

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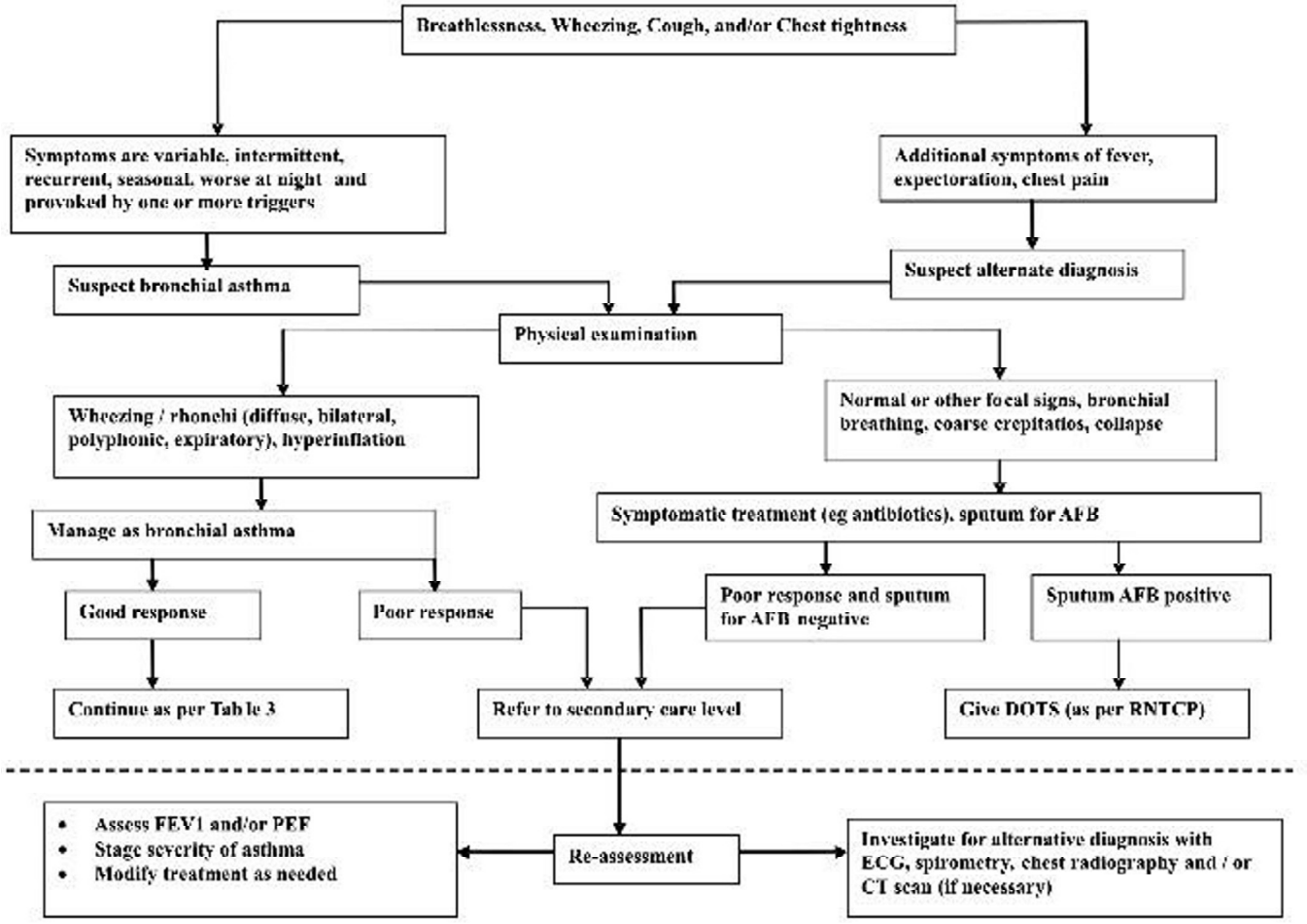

Fig. 1 : Approach to diagnosis of bronchial asthma.

Table 1

Difference between Asthma and COPD

	Asthma	COPD
Onset	Anytime	Mid to late adult life
Smoking	±	++
Cough and sputum	Less common	Common
Dyspnoea on exertion	Variable	Progressive
Nocturnal symptoms	Common	Uncommon
Airway obstruction	Diurnal variation	Little variation
Response to CS	Good	15-20%
Non specific BHR	Majority of patients	Only in minority of patients

exclude asthma mimics while the next step includes the confirmation of diagnosis in equivocal cases based on laboratory investigations. At the primary and secondary health care levels of regimental medical officer and a physician at a peripheral hospital respectively, the diagnosis is mainly clinical. A " Peak Flow Meter" should be used to confirm the reversibility and severity of the disease. Peak flow meters are commonly available and patient should be instructed to record the peak flow rates in the morning and evening. A diurnal variation of more than 20% is considered diagnostic.

At the tertiary health care level spirometry is recommended. Further skin sensitivity testing may demonstrate the allergens.

Treatment

There is no permanent cure for asthma however the disorder can be adequately controlled with drugs. The optimal asthma control [1] would include minimal chronic symptoms, minimal exacerbations, minimal need for use of ?2-agonist, no limitations on activities, including exercise and PEFR variability of less than 20 percent.

Assessment of severity is important before treatment is initiated (Table 2) and patient should be placed in the highest category of severity based on any of the clinical features or lung function tests.

Basic drug therapy : Asthma is an inflammatory disorder and the aim of treatment is to decrease inflammation by anti- inflammatory drugs and exposure to triggers. The drugs can be grouped under controllers; those which control inflammation and relievers; those which offer symptomatic relief (Table 3).

Inhaled route is the best route of corticosterioid (CS) therapy as it provides targeted drug delivery, acts faster, small dose is required and is easy to take [10,11]. Oral steroids have more side effects and have no superiority

over ICS in management of asthma. However in management of severe acute exacerbations they are beneficial.

Inhaled corticosteroids (ICS)

Most effective medication for asthma and first- line therapy [12,13]. They are anti inflammatory and disease modifying resulting in improved lung function, reduction of symptoms and exacerbations. The dosage of inhaled corticosteroids is given in Table 4.

Combinations (ICS + long acting ?$_2$ agonist)

Long acting ?$_2$ agonists are helpful in improving asthma control and airway functions when inhaled corticosteroids are insufficient [14]. Long acting inhaled ?2-agonist (formoterol and salmeterol) should not be used as a monotherapy in asthma as they do not appear to influence the airway inflammation in asthma. They are most effective when combined with inhaled glucocorticosteroids and this combination therapy is the preferred treatment when a medium dose of inhaled glucocorticosteroid alone fails to achieve control of asthma. They have steroid sparing effect and lead to better asthma control.

Leukotriene Inhibitors

- New class of asthma medication
- Not superior to inhaled corticosteroids
- Indicated for aspirin induced, exercise induced asthma and add on therapy for severe persistent asthma [15].

Table 2
Categorization of severity of asthma

	Symptoms	Nocturnal symptoms	FEV1/PEFR
Stage 4 Severe persistent	Continuous	Frequent	<60% predicted variability >30%
Stage 3 Moderate persistent	Daily	>1 time a week	60-80% predicted variability >30%
Stage 2 Mild persistent	>1 time a week but <1time a day	>2 times a month	>80% predicted variability 20-30%
Stage 1 Intermittent	<1 time a week	<2 times a month	>80% predicted

Table 3
Drug Therapy

Controllers	Relievers
Inhaled steroids	Inhaled short acting ?$_2$ agonist
Long acting ? agonists	Inhaled anticholinergics
Leukotriene receptors antagonists	Oral theophyllines (short acting)
SR theophyllines	

Anti IgE (omalizumab) is a treatment option limited to patients with elevated serum levels of IgE. Its current indication is for patients with severe allergic asthma who are uncontrolled on inhaled glucocorticosteroids, although the dose of concurrent treatment has varied in different studies. Improved asthma control is reflected by fewer symptoms, decreased doses of reliever medications and fewer exacerbations. The management of asthma in different stages is given in Table 5.

Exacerbation of Asthma

Exacerbation of asthma is characterized by the worsening of symptoms with increase in dyspnoea, cough and wheeze. There is a decline in lung function, which can be quantitated with measurements of PEF or FEV1. The exacerbations are categorized as severe or non severe. Severe exacerbation of asthma are characterized by increase in dyspnoea, with patient unable to complete one sentence in one breath (in children : interrupted feeding and agitation), respiratory rate> 30/minute, heart rate> 120/minute, use of accessory muscles of respiration, pulsus paradoxus > 25 mmHg, PEF< 60% personal best or < 100 litres/ minute in adults.

In children, the normal respiratory and pulse rates are different from adults and values exceeding normal limits should not be considered abnormal.

Management of Non-Severe Exacerbations

Patients with non-severe exacerbations can usually be managed on an outpatient basis, with repeated administration of rapid acting inhaled ?$_2$ agonists (2 puffs

Table 4
Dosage of inhaled corticosteroids

Drug	Low dose (mcg)	Medium dose (mcg)	High dose (mcg)
Beclomethasone	200-500	500-1000	>1000
Budesonide	200-600	600-1000	>1000
Fluticasone	100-250	250-500	>500
Ciclesonide	80 - 160	160 - 320	320 - 1280

Table 5
Management of asthma in different stages at various levels

Stage	Daily controller medication	Other treatment options
Mild	Low-dose ICS	Sustained-release theophylline
Moderate	Moderate dose ICS+ inhaled long acting ?$_2$ agonist or Leukotriene inhibitor	- Moderate dose ICS + either sustained - release theophylline or long acting ?$_2$ agonist or Leukotriene inhibitor - High-dose ICS
Severe	High dose ICS inhaled + inhaled long acting ?$_2$agonist or Leukotriene inhibitor	Oral glucocorticoid Anti-IgE (omalizumab)

every 20 minutes for the first hour), which is the best and most cost-effective method to achieve rapid reversal of airflow limitation.Oral glucocorticoids (1mg/kg prednisolone daily for 7-10 days) should be used in all but the mildest exacerbations as they significantly reduce the number of relapses and decreases beta-agonist use without an apparent increase in side effects. A rough guide is to use oral steroids if response to the rapid acting inhaled $?_2$ agonist alone is not prompt or sustained (PEF>80% personal best) after one hour.

Management of Severe Exacerbations

Severe exacerbations of asthma can be life-threatening and should be managed as an emergency. After initial beta-agonist, ipratropium inhalation/ nebulization, oxygen and one parenteral dose of steroids the patient should be referred to secondary/tertiary care centre. The important points in the management of acute severe asthma are summarised below:

1. A hand-held chamber is as effective as a nebuliser for the delivery of drugs used in acute asthma.
2. The use of intravenous aminophylline does not result in any additional bronchodilation as compared to inhaled beta-agonists, but the frequency of adverse effects is higher with aminophylline. Thus, it should be used only if patient is not cooperative or inhaled therapy is ineffective.
3. A combination of ipratropium plus salbutamol is better than salbutamol alone in the management of severe exacerbations [16].
4. The use of continuous beta-agonists (defined as truly continuous aerosol delivery of beta-agonist medication using a large volume nebuliser or sufficiently frequent nebulisations so that medication delivery is effectively continuous, i.e. one nebulisation every 15 minutes or four times per hour) in patients with severe acute asthma improves their lung functions and reduces hospitalization in patients who present to the emergency department [17].
5. Glucocorticoids are the mainstay of therapy [18,19] and their use within an hour of presentation significantly reduces the need for hospital admission in patients with acute asthma. There is no advantage of parenteral over oral glucocorticoids except in few circumstances [18]. There is also no advantage of a particular preparation of glucocorticoids in acute asthma, and a maximum dose of 40-60mg/day of prednisolone is given and continued for at least 7-10 days or until recovery.
6. Inhaled corticosteroids have no added benefit when used in addition to oral steroids.
7. There is no evidence to support the use of intravenous $?_2$ -agonists in acute severe asthma and they should be given by inhalation.
8. In resistant cases administration of a single dose of intravenous magnesium sulphate (2 gm over 20 minutes) improves pulmonary function when used as an adjunct to standard therapy [20]. The treatment should be used with great caution and monitoring.
10. There is no role of routine use of antibiotics except if patient has fever, leukocytosis, purulent sputum or radiographic infiltrates suggestive of an infection.
11. A written advice mentioning the drugs, their dosages, frequency and requirement for follow-up visits is a must.

The Stepwise Management

Hour 1 : (i) oxygen administration, (ii) hydration (intravenous fluids), (iii) up to four doses of inhaled salbutamol with ipratropium, (iv) intravenous hydrocortisone (100mg) or oral prednisolone (40-60mg).

Hour 2 : (i) four more doses of inhaled salbutamol with ipratropium, (ii) intravenous aminophylline, (iii) intravenous magnesium sulphate 2gm, (iv) subcutaneous terbutaline 0.3-0.5mg (0.01mg/kg-child)

Patient Referral

The indications for referral of a patient with suspected/ established asthma to an advanced center are atypical signs or symptoms (significant expectoration > 60ml/ day, hemoptysis, monophonic wheeze), failure to respond to treatment for over one month, severe persistent or life threatening asthma (cyanosis, mental obtundation), acute severe asthma not responding within two hours of intensive therapy, other complicating conditions and in cases of doubtful diagnosis.

Environmental control

Pharmacological therapy alone will not give a good control of asthma. Mattress and pillow covers should be free of mites. Removal of carpeting and vacuming of furniture helps. Animal pets at times are the offending allergens and may have to be removed from home.

Asthma education : Asthma education is an important but often neglected aspect of asthma management in our country [21]. It is not only the patient and their family members but also the general practitioners at the peripheral care levels who need to continuously keep themselves updated on asthma [22,23]. There is little doubt that efforts to improve the implementation of evidence based guidelines by clinicians will increase the quality of patient care.

Conflicts of Interest

None identified

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