

BRONCHIAL ASTHMA

Definition: What is asthma?

- Asthma is meaning difficulty in breathing. Asthma is a chronic inflammatory lung disease involving recurrent breathing problems: paroxysmal attacks of dyspnea, cough and wheezing.

What is a risk factor?

A risk factor is anything that may increase a person's chance of developing a disease, it may be:

- An activity: called exercise-induced asthma.
- Diet: egg, fish, milk.
- Drugs: aspirin and penicillin.
- Family history: urticaria, hayfever.

OR many other things:

- Inhalants: dust, pollens, fumes, leathers, moulds.
- Infection: septic focus, tonsillitis, sinusitis, bronchitis.
- Hormonal ex: attacks of asthma occur during pregnancy or menstruation or during menopause.

- If the allergen is endogenous asthma is called intrinsic (ex. septic focus). If allergen is exogenous asthma is called extrinsic asthma or atopic asthma.

Extrinsic asthma

- Definite allergen
- Younger subject usually < 30y
- +ve family H of allergy.
- High level of IgE
- Other signs of allergy

ex. Hay fever,
rhinitis

Intrinsic asthma

- No definite allergen
- > 40 y.
- -ve FH
- N IgE
- -ve

Pathogenesis

The triggers of asthma activate many inflammatory cells in the bronchial tree: mast cells, macrophages, eosinophils, lymphocytes, bronchial epithelial cells, platelets and neutrophils.

- All these cells are responsible for release of soup of inflammatory mediators e.g: histamine, prostaglandins, leukotrienes, platelets activating factors, bradykinin, adenosine, serotonin, neurokinin, complement fragments and O₂ radicals

■ **These mediators cause:**

- 1- Bronchoconstriction.
- 2- Microvascular leakage (oedema and exudate).
- 3- Mucous hypersecretion.
- 4- Bronchial hyperresponsiveness

Pathology

- Hypertrophy of br. smooth muscle.
- Br walls are oedematous and show infiltration with eosinophils, neutrophils and lymphocytes.
- Oedema and hyperaemia of the mucosa.
- Thickening of lamina propria with deposition of type III, V collagen.

Clinical picture

1- Symptoms

- Cough.
- Dyspnea may occur.
- During exercise (exercise-induced asthma).
- After exposure to specific allergen (extrinsic asthma).

Clinical picture (cont.)

Symptoms (cont.):

- Without definite reason (intrinsic asthma).
- Wheezes.
- Anxiety.

Clinical picture (cont.)

2- Vital signs

- Tachypnea.
- Tachycardia.
- Pulsus paradoxus. Its magnitude correlates with the severity of asthma.

Clinical picture (cont.)

3- Chest signs

- Hyperinflated chest with increased A.P diameter.
- Prolonged exp. phase.
- Skin retraction over IC spaces with inspiration.

3- Chest signs (cont).

- Use of accessory m.
- Hyperresonant percussion note.
- Inspiratory and expiratory polymorphic wheezing.
- Diminished breath sounds as index of severe obstruction

Differential Diagnosis

- 1- Cardiac asthma.
- 2- Other causes of dyspnea:
 - General causes: aneamia, thyrotoxicosis, acidosis, uraemia.

Differential Diagnosis (cont.)

- Local causes:

- a- Ventilatory dysfunction:

- Obstructive: emphysema, T, F.B, mediastinal syndrome.
- Restrictive: pn., collapse, pneumothorax, pl.effusion, pul.oedema., chest cage deformity, diaph.paralysis, myopathies, obesity.

Differential Diagnosis (cont.)

- Local causes:

b- Diffusion defect: ISF,
pneumoconiosis, sarcoidosis
collagenosis, reticulosis.

c- Perfusion defect: pul. E, Intrapul.
shunts.

3- Psychogenic dyspnea.

What are the complications of br. asthma?

- 1- Infections.
- 2- Emphysema and its sequela
corpulmonale.
- 3- Spontaneous pneumothorax.
- 4- Anxiety state.

Investigations

To diagnose asthma, physicians rely on combination of medical H., physical examination and laboratory tests which may include

Investigations

- X-ray chest:
 - N. x-ray in mild and moderate cases.
 - Severe cases show hyperinflation.
 - Pneumomediastinum, pneumothorax in complicated cases.

Investigations

- ECG:
 - ◆ Sinus tachycardia in mild and moderate cases.
 - ◆ ST seg. depression, T wave inversion, P. pulmonale and RBBB in severe asthma.

Investigations (cont.)

- Sputum: eosinophils and charcot's laden's crystals.
- Blood picture: eosinophilia in allergic cases, neutrophilia in infected cases.
- Skin tests: these are suggestive than diagnostic.

- Spirometry : FEV1 ↓, PEFR ↓, MMEFR ↓.

FEV1 < 50% of predicted in severe obstruction.

50-70% of predicted in moderate.

70-80% of predicted in mild.

> 80% No spirometric abnormalities

TLC, RV, FRC increase.

Status asthmaticus

-A severe, progressive, prolonged attack of asthma which persists more than 6h. despite bronchodilators and all therapy of asthma.

-The patient is in distress, cyanosed, $\uparrow\text{CO}_2$. He may develop vascular collapse, lowering blood pressure because raised i.th.pr. interfere with the venous return. Dehydration may occur due to loss of fluid from hyperventilation.

Classification of asthma severity and treatment in stepwise approach

Step 1:

Intermittent

- Symptoms < 1 time/w.
- Night asthma < 2 times/mo.
- PEF or FEV1 > 80% of pred.

Treatment

- Short acting inhaled β_2 agonists when needed.
- Na cromoglycate 1h. before exercise.

Classification of asthma severity and treatment in stepwise approach(cont.)

Step 2: Mild

- Symptoms > 1 time/w but < 1 time /d.
- Exacerbation affect the activity and sleep.
- Night asthma > 2 times/m.
- PEF or FEV1 > 80% pred.

Treatment

- Short acting β_2 agonists as needed but not exceed 3-4 times/d.
- Add inhaled corticosteroid daily, cromoglycate or antileukotrienes.
- Long acting β_2 agonists for night symptoms.

Classification of asthma severity and treatment in stepwise approach(cont.)

Step 3: Moderate

- Symptoms daily.
- Exacerbation affect activity.
- Night asthma > 1 a week.
- PEF or FEV1 60-80% of pred.

Treatment

- Short acting β_2 agonists + inhaled corticosteroids d.
- Add SR aminophylline or long acting β_2 agonists for night symptoms and/or antileukoterienes.

Classification of asthma severity and treatment in stepwise approach(cont.)

Step 4: Severe

- Continuous symptoms.
- Frequent exacerbation. • Frequent night asthma.
- ↓ activity by symptoms.
- PEF or FEV1 < 60% of pred.

Treatment

- Inhaled β_2 agonists as needed.
- Inhaled corticosteroids/daily.
- Long acting β_2 agonists or SR theophylline.
- Add oral steroids on alternate days in the morning.

Treatment of Asthma

Treatment of Precipitating Factors:

- Avoid allergen.
- Give suitable antibiotic – manage the psychological factors.

- ◆ Establishment of patent airways by drugs used in bronchial asthma:

1- Bronchodilators:

A- Sympathomimetic drugs

B- Aminophyllin

A- Sympathomimetic drugs:

- Adrenaline: 1/1000 subcut 0.5c.c/min for 3 times.
- Isoprenaline 1/100 inhalation by nebulizer.
- Ephedrine: asmac/ephedrine, asmasone, 15-60mg/3td.
- Salbutamol (ventolin) 2mg/3td.
- Terbutalin (bricanyl) 1-3 tab/d.

B- Aminophyllin IV 0.5gm as 10% solution very slowly.

2-Corticosteroids: antiinflammatory,
stabilize mast cell.

- Cortisone 25-200mg
- Hydrocortisone 10-20mg
- Prednisone 5-10mg
- Prednisolone 5-10mg

Repeated as frequent as needed

3- Antiallergic:

- Antihistamine: phenergan 25mg, antistine 100mg.
- Antileukotrienes: 10mg/once d-5mg/d for children 6-14 Y.
- Antihistamine + antiserotonin (periactin) 4mg.

4-Na cromoglycate (intal) 2-4 cap./d:

Stabilize and prevent release of mediators
from mast cells.

Management of acute exacerbation of BA

PaCO₂ > 40 or PEF < 25% of baseline or deterioration despite maximal therapy
→ transfer to ICU.

ICU treatment

- Inhaled β_2 agonists every 30-60 min by nebulizer.
- Supplement with subcutaneous epinephrine.
- IV aminophylline / protocol.
- Hydration 1-2L of 5% dextrose.
- Hydrocortisone 200mg or more added to dextrose.
- O₂ nasal catheter, or mask, or non invasive ventilation or intubation and mechanical ventilation

THANK YOU