Asthma

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Information

Asthma is obstructive lung disease characterised by ***episodic*** **reversible broncoconstriction**, usually triggered by a **Type I allergic stimulus**. This differentiaties it from Chronic Pulmonary Disease (COPD), which symptoms are normally not reversible. It is most common in **children**, and is associated with other **atopic** conditions (e.g. *Rhinitis*, *Eczema*)

Important

- Key diagnosis is usually clinically, with symptoms and FEV1 improvment of 12-15% **after albuterol**
- If not-reversible, then unlikely Asthma, more likely Chronic Pulmonary Disease (COPD)
- Try to do a CXR to rule out if pneumonia/infection
- If PaCO2 is increased during acute asthma attack, patient is having a respiratory attack
- Empiric antibiotics are **not recommended** during an acute attack. Unlike Chronic Pulmonary Disease (COPD), where you always give empiric antibiotics, regardless of CXR
- Corticosteroids will cause increased immature WBC (left-shift) for acute exacerbation, *do not assume* increased WBC means infection
- For patients with Aspirin-sensitive asthma, treatment is Leukotriene receptor antagonist such as Montelukast, see Asthma > ^39e8fe

1. Pathophysiology

1.1. *Aspirin-sensitive asthma*:

Can trigger Asthma in patients with Aspirin Exarcerbated Respiratory Disease (AERD). They have symptoms of asthma and rhinosinusitis. It comes from a dysregulation of arachidonic acid metabolism, leading to overproduction of leukotrienes.

Important

> - For patients with Aspirin-sensitive asthma, treatment is Leukotriene receptor antagonist such as Montelukast, see Asthma > ^39e8fe

History

1. Signs

1.1. *Symptoms*

Acute asthma attack:

1. Have ***episodic*** symptoms
2. Dysnea
3. ***Wheezing***
4. Cough
5. Chest tightness
6. Decrease in peak flow from baseline

1.2. *Risk factors*

1. Young age: It is possible with adults, but common in young age
2. **Allergens** - A Type I hypersensitivity reaction
3. Stress
4. Exercise
5. **Aspirin** - See Asthma > *Aspirin-sensitive asthma*:
6. Family history of allergic reactions

1.3. *Questions to ask*

"Do you notice any shortness of breath?"
"Do you notice any wheezing? Any cough?"
"Any history of allergies? Family history of allergies?"
"Is this consistent, or does it come in attacks/episodes?"
"Does it come when you're stressed, such as exercise?"
*"Do you take aspirin?"

2. Examination findings

Key Findings	Result	Explanation
Expiratory phase	Increased	Due to broncho-constriction of vessels Also called decreased I/E ratio Inspiration time less than expiration

Additional Findings	Result	Explanation
Pulsus paradoxes	Fall >= 10mmHg with inspiration	Most non-cardiac cause of pulsus paradoxus

3. Investigations

Key Tests	Result
Peak flow meter	Reduced peak flow
Spirometry	Reduced FEV1 Reduced FEV1/FVC ratio FEV1 improvmeent 12% after Albuterol
CXR	Rule out pneumonia/infection for acute exarcebation
Methacoline challenge	Causes bronchoconstriction <=20mcg dose needed for FEV1 reduction by 20% People without asthma can handle high methacoline levels, asthma patients cannot

Additional Tests	Result
FBC	Increased eosinophils
IgE levels	Increased

Important

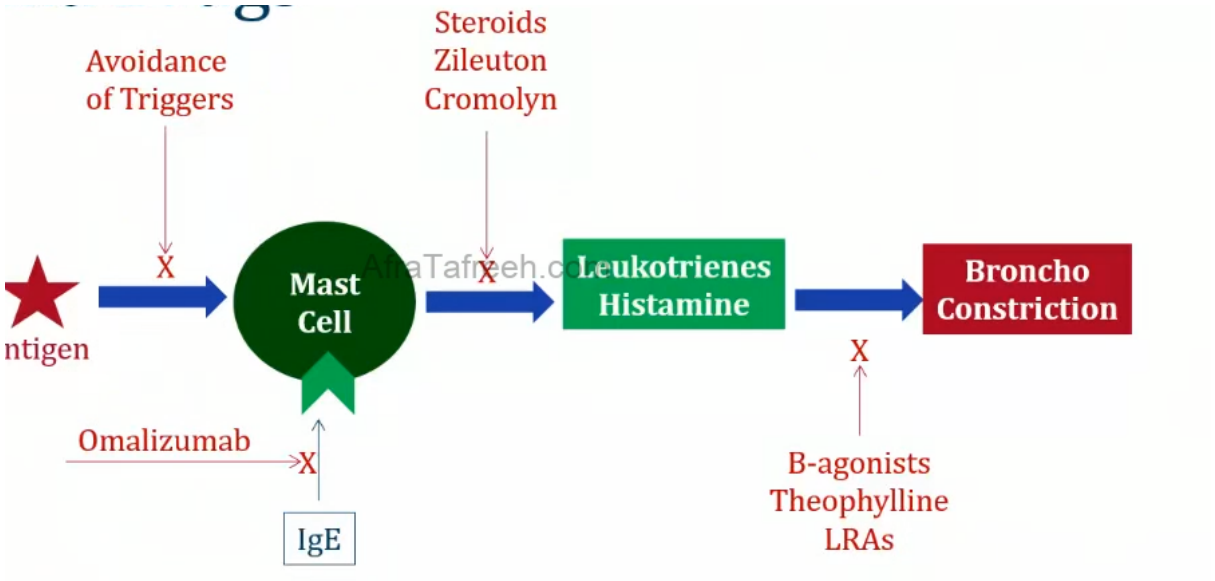
- Key diagnosis is usually clinically, with symptoms and FEV1 improvment of 12-15% **after albuterol**

Management

1. Treatments

1.1. *Possible drugs:*

1. Beta-antagonist
    1. Short-acting Beta-antagonist (SABA): Albuterol
    2. Long-acting Beta-antagonist (LABA): Salmeterol, Formoterol
        1. Used with inhaler over long period of time for daily use
    3. Rarely have side effects, can cause tremor and palpitations
2. Corticosteroids
    1. Can be given inhaled, oral, or IV
    2. Often cause thrush, which can be prevented by rinsing and spaces (less likely to get to mucosoul membrane)
3. Eicosanoids
    1. Montelukast: Blocks leukotrienes effect. Useful in aspirin-sensitive asthma
    2. Zileuton: Blocks lipoxygenase from converting arachidonic acid to leukotrienes
4. Omalizumab:
    1. IgG monoclonal antibody that inhibits IgE binding to IgE receptor on mast cells and basophills, prevents degranulation
    2. Given by subcutaneous injection
5. Cromolyn:
    1. Inhibits mast cell degranulation, blocks release of histamine and leukotrienes
6. Theyophylline:
    1. *Rarely* used for asthma, more commonly used for Chronic Pulmonary Disease (COPD)
    2. Acts as a bronchodilator



1.2. *Acute Asthma*

1.2.1. *Management*:

1. Provide patient with **oxygen**
2. Provided nebulazied Albuterol

3. Corticosteroids needed for period of time:
    1. Prednisone 60mg daily
    2. Methylprednisone 80mg IV q8hrs
4. Rarely can be used:
    1. Ipratropium: Acts as muscurinic antagonist, more commonly used in Chronic Pulmonary Disease (COPD)
    2. IV Magnesium sulfate
5. ABG for normal or increased PaCO2. If so, intubate
    1. PaCO2 should be low in asthma patients since hyperventilation. If increased, onto respiratory muscle weakness. Very abnomal

Important

- Empiric antibiotics are **not recommended** during an acute attack. Unlike Chronic Pulmonary Disease (COPD), where you always give empiric antibiotics, regardless of CXR

Important

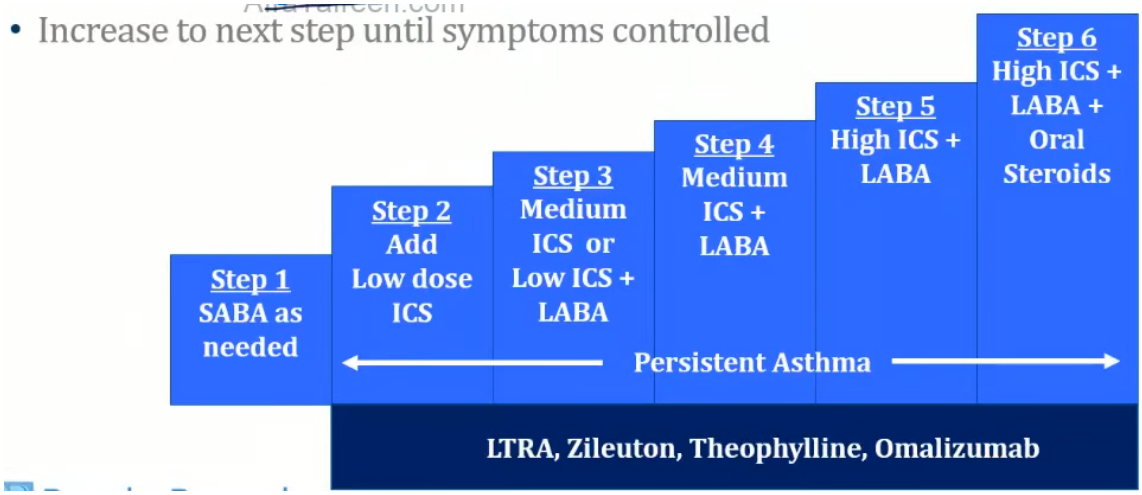
- Corticosteroids will cause increased immature WBC (left-shift) for acute exacerbation, *do not assume* increased WBC means infection

1.3. *Long-term Asthma*

1. Calculate the **Asthma Severity**:

	Daytime Symptoms	Nighttime Symptoms	Therapy
Intermittent: *No activity limitations* *Normal PFTs*	<= 2/week	<= 2/month	Step 1
Mild persistent	> 2/week	3-4/month	Step 2
Moderate persistent	Daily	>1/week	Step 3
Severe persistent	Daily	4-7/week	Steps 4+

2. Check the relevant chronic therapy result:



2. Criteria

2.1. *Asthma Severity*

	Daytime Symptoms	Nighttime Symptoms	Therapy
Intermittent: *No activity limitations* *Normal PFTs*	<= 2/week	<= 2/month	Step 1
Mild persistent	> 2/week	3-4/month	Step 2
Moderate persistent	Daily	>1/week	Step 3
Severe persistent	Daily	4-7/week	Steps 4+

Complications

1. Status asthmaticus: Persisent asthma symptoms that cannot be managed, and can lead to **death**

Extra

1. References:

1. *Boads and Beyond - STEP 2:* Pulmonary > Respiratory Diseases > Asthma