Asthma and Status Asthmaticus

Cline, Ma p. 212-218
(5th ed) p. 379-382

Ma, Cline p. 192-195 ; 289
(6th ed) p. 340-343

Objectives

Upon completion of this lecture, you should be able to:

- Define asthma
- Discuss the epidemiology of asthma
- Discuss the different types of asthma presentations
- Discuss the pathophysiology of asthma

Objectives , cont.

Upon completion of this lecture, you should also be able to:

- Define Severe Acute Asthma and status asthmaticus
- Discuss natural course of untreated status asthmaticus
- Discuss the treatment for asthma and how the treatment for Severe Acute Asthma differs from that of chronic asthma

Acute Asthma

Definition:

- An underlying chronic inflammatory airway disorder
- with a deterioration condition characterized by
  - sudden, spasmodic,
  - reversible narrowing of the bronchial airways due to
    - bronchial inflammation and
    - bronchial smooth muscle contraction.

Asthma Types

- Reactive Airway Disease (RAD)
  - Atopic [allergic]
  - Environmental
- RAD may occur
  - de novo (new; "out of the blue")
  - exacerbation of existing, chronic RAD
    - Pediatric
    - COPD, with asthma

Asthma Types

911 - presentation

- First ever
  - Environmental
  - Atopic
  - CHF
- Recurrent
  - Pediatric
  - COPD, with asthma
- CUPS
  - P - Moderately Severe Asthma
  - CU - Severe Acute Asthma

Asthma Epidemiology

Children:

- Serious disease
  - despite continued research and the development of new pharmacological agents
- One of leading causes for emergency care
- 10 % of the pediatric population
- The most common chronic disease of childhood
  - missed school
  - considerable morbidity, disability, and even mortality
- Increasing incidence
- Increasing death rate

Magnitude of the Problem

- 150 million asthmatics worldwide
- Prevalence increasing in most countries (20 to 50% every ten years)
- Significant cause of school/work absence
- Health care expenditures very high
- 1 million unnecessary deaths each decade

Cost of Illness

Direct Medical Care

- Primary Care
- Medications
- Prehospital Care
- Emergency Dept.
- ICU

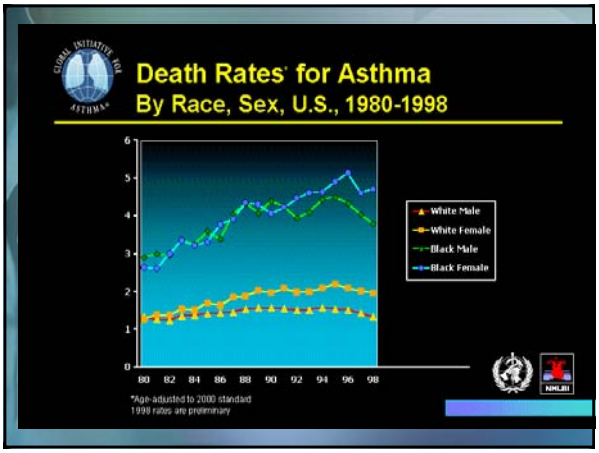
Indirect Medical Costs

- Loss of School
- Loss of Work

Social Impact

- Loss of social capital
- Social security

Hospitalization Rate Changes for Asthma by Age



Pathophysiology

Chronic inflammatory disorder of the airway

Classical triad:

1. Cellular and chemical inflammation and thickening of the airway
2. Increased mucus secretion
3. Contraction of smooth muscle of airways
   - AKA
     - Airway hyperresponsiveness
     - Bronchoconstriction
   - Leads to dyspnea ; wheezing ; WOB)

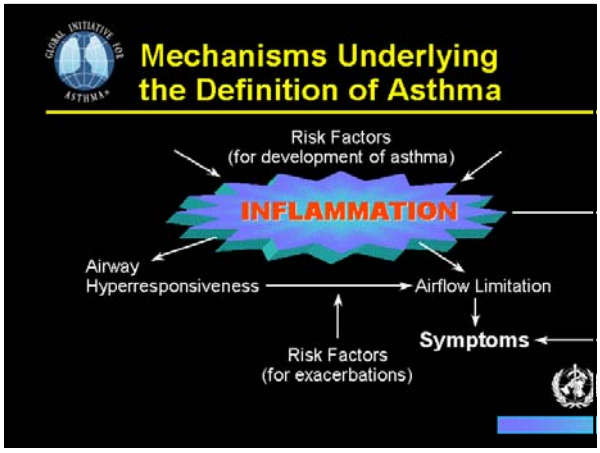
Pathophysiology

The inflammatory component is central and causal

- Antigen [allergen] - antibody interaction (atopy)
  - Activates the production of arachidonic acid
    - metabolized to vasoactive prostaglandins or
    - *leukotrienes*

Pathophysiology

- Leukotrienes (1000 X more potent than histamine)
  - Bronchoconstriction
  - Mucous production
  - Inflammation
    - Infiltration of mast cells, eosinophils, basophils, and lymphocytes
    - Vascular leakage (permeability)
      - edema



Mechanics Underlying Asthma

Airway obstruction

- due to narrowing of bronchioles
- causes increased airway resistance
- resulting in low forced expiratory volumes and flow rates
- Obstruction causes premature closure of airways and air trapping.
- blockage of airways from secretions and wall thickening causes atelectasis which leads V/ Q mismatch

Mechanics Underlying Asthma

Airway obstruction / Air trapping

- Respiratory
  - leads to hyperinflation
  - Increased intrathoracic pressure
  - increase in work of breathing
  - may cause airleaks [blow outs]
    - pneumothorax, pneumomediastinum)
- BP
  - Hypotension
    - due to reduction of venous return by increased intrathoracic pressure .
    - can cause hypoxia and decreased tissue perfusion

Risk Factors for Asthma

- Asthma occurs in families
- Atopy: The ***strongest*** identifiable risk factor for the development of asthma
- Allergen exposure and chemical sensitizers
- Contributing factors may increase susceptibility to development of asthma in predisposed individuals

Risk Factors for Asthma

- Predisposition
  - Atopy
- Causal Factors
  - Indoor Allergens
    - Animal dander; mite and roach allergens
    - Fungal
  - Outdoor Allergens
    - Pollens
    - Fungi
  - Occupational
- Contributing factors
  - Respiratory infections
  - Diet
  - Stress
  - Air pollution
    - Outdoor
    - Indoor
  - Smoking
    - Active
    - Passive

Common Conditions that Trigger Asthma

- Respiratory infections
  - viral
  - bacterial
- Exercise and hyperventilation
- Weather Changes
  - Allergens
  - Sulfur dioxide
- Food, additives, drugs (ASA)

Status Asthmaticus

- Status asthmaticus, if untreated, can result in respiratory failure and death
- Do not waste time in the field, while in route,
- Albuterol 0 .15 mg/kg, every 20 minutes or as continuous nebulization
- Ipratropium (Atrovent) 250 mic. in 2 ml saline
- Magnesium 50 mg/kg IV , over 20 minutes I V NS 20 cc / kg

For Status Asthmaticus Intubation :

Consider

- Ketamine (1mg / kg IV)
  [bronchodilating + sedating]
- Avoid morphine
- Helium-0_2 mix (heliox)
  (60% helium/40% O2*)
  * therefore heliox cannot be used if child requires more than 40% Fi02

Risk factors associated with asthma deaths

- **"1,2,3 ASAP"**
- **1** prior (or current) 1ntubation
  1 hospitalization / ED within 1 month
  2 or more hospitalizations for asthma
  3 or more ED visits in past year
  +/ or
  A LOC : syncope, seizure
  S teroid dependence
  A ccess to health care is poor / problematic
  P sycho social problems

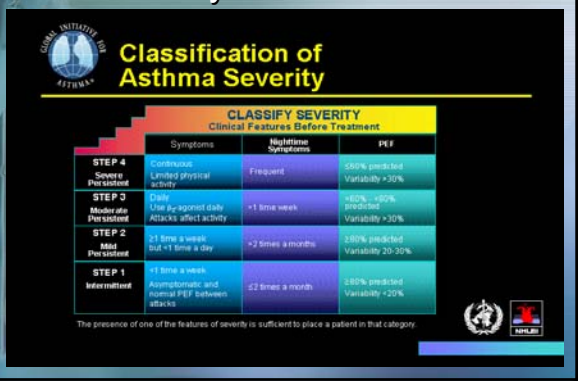
Factors Associated with Non-Compliance

- Medication Usage
  - Difficulties associated with inhalers
  - Complicated regimens
  - Fears about, or actual side effects
  - Cost

Patient/Physician

- Misunderstanding/lack of information
- Underestimation of severity
- Attitudes toward ill health
- Cultural factors
- Poor communication

Severity



Summary

We have discussed :

- The definition, epidemiology, pathophysiology, and types of presentations of asthma
- The clinical presentation and seriousness of Severe Acute Asthma and status asthmaticus
- The treatment for asthma

Web Pages for Asthma

- http://www.ginasthma.com/ginaslides/sld006.htm
- I think that you'll find slides # 6-40 the most helpful

- Reference
  - http://www.pediatriconcall.com/fordoctor/DiseasesandCondition/asthma.asp