Allergic Reactions & Anaphylaxis

Incidence
- In USA - 400 to 800 deaths/year
- Parenterally administered penicillin accounts for 100 to 500 deaths per year
- Hymenoptera stings account for 40 to 100 deaths per year
- Risk factors: beta-blockers, adrenal insufficiency

Causes of Deaths
- Laryngeal edema and acute bronchospasm with respiratory failure account for >70%
- Circulatory collapse accounts for 25%
- Other <5% - ?brain ?MI

Allergic Reaction
- Physiologic response to antigens
- Oversensitive response = allergic
- Occurs after sensitization to antigen
- Antigen binds with Antibody
- Less severe reaction from the inflammatory response

Allergic Reactions
- Generally classified into 3 groups:
  - Mild allergic reaction
  - Moderate allergic reaction
  - Severe allergic reaction (anaphylaxis)

Mild Allergic Reaction
- Characteristics
  - Urticaria (hives), itchy
  - Erythema (redness)
  - Rhinitis
  - Conjunctivitis
  - Mild bronchoconstriction
  - Usually localized (look on abdomen, chest, back)
- No SOB or hypotension/hypoperfusion
- Often self-treated at home
**Urticaria**

**Moderate Allergic Reaction**
- Characteristics
  - Mild signs/symptoms with any of the following:
    - Dyspnea, possibly with wheezes
    - Angioneurotic edema
    - Systemic, not localized
  - No hypotension/hypoperfusion

**Angioneurotic Edema**

**Severe Allergic Reaction (Anaphylaxis)**
- Characteristics
  - Mild and/or moderate signs/symptoms plus
  - Shock / hypoperfusion
  - Respiratory distress

**Anaphylaxis**
Manifestation of immediate hypersensitivity in which the exposure of a sensitized individual to a specific antigen results in life-threatening respiratory distress followed by vascular collapse and shock.

**Pathophysiology**
- Antigen
  - Induces antibody formation
- Examples
  - Drugs (antibiotics)
  - Foods (nuts, shellfish)
  - Insect venoms
  - Animal serum
  - Incompatible blood types
Pathophysiology

- Antigen enters body
  - Ingestion, absorption, inhalation, injection
- Antibodies produced
- Attach to surface of mast or basophil cells
- Mast cells become sensitized

Pathophysiology

- Mast cells
  - In all subcutaneous/submucosal tissues,
    - Including conjunctiva, upper/lower respiratory tracts, and gut
- Basophils
  - Circulate in blood

Pathophysiology

- Antigen reenters body
- Attaches to antibodies on mast or basophil cells
- Mast cell degranulates, releases
  - Histamine
  - Leukotrienes
  - Slow reacting substance of anaphylaxis (SRS-A)
  - Eosinophil chemotactic factor (ECF)

Vasodilation

- Decreased peripheral vascular resistance
- Hypotension
- Tachycardia
- Peripheral hypoperfusion

Increased Capillary Permeability

- Tissue edema, urticaria (hives), itching
- Laryngeal edema
  - Airway obstruction
  - Respiratory distress
  - Stridor
- Fluid leakage from vascular space
  - Hypovolemic shock

Smooth Muscle Spasm

- Bronchospasm
  - Respiratory distress
  - "Tight Chest"
  - Wheezing
- GI Tract Spasm
  - Nausea, vomiting
  - Cramping, diarrhea
- Bladder Spasm
  - Urinary urgency
  - Urinary incontinence
Presentation

- Dependent on:
  - Degree of hypersensitivity
  - Quantity, route, rate of antigen exposure
  - Pattern of mediator release
  - Target organ sensitivity and responsiveness

Severity varies from mild to fatal

Most reactions are respiratory, dermatologic

Less severe early findings may progress to life-threatening over a short time

Initial signs/symptoms do NOT necessarily correlate with severity, progression, duration of response

Generally, quicker symptoms = more severe reactions

First manifestations involve skin

- Warmth and tingling of the face, mouth, upper chest, palms and/or soles, or site of exposure
- Erythema
- Pruritus is universal feature, erythema
- May be accompanied by generalized flushing, urticaria, nonpruritic angioedema

May progress to involvement of respiratory system

- Cough
- Chest tightness
- Dyspnea
- Wheezing
- Throat tightness
- Dysphagia
- Hoarseness

Other Signs and Symptoms

- Lightheadedness or syncope caused by hypotension or dysrhythmia
- Nasal congestion and sneezing
- Ocular itching and tearing
- Cramping abdominal pain with nausea, vomiting, or diarrhea
- Bowel or bladder incontinence
- Decreased level of consciousness

Findings may include:

- Urticaria, angioedema, rhinitis, conjunctivitis
- Tachypnea, tachycardia, hypotension
- Laryngeal stridor, hypersalivation, hoarseness, angioedema

Physical Exam
Patient Care

- ABCs
- Medics
- EpiPen for anaphylaxis
- Position of comfort
- Oxygen
- Calm & reassure the patient
- Transport

ALS Indicators

- Unstable vital signs
- EpiPen use
- Respiratory Distress
- Signs & symptoms of shock:
  - Poor skin signs
  - Sustained tachycardia
  - Hypotension