Chapter 8
Anaphylaxis

Learning Objectives

- List symptoms of anaphylactic shock
- Discuss role of immune system in fighting antigens
- Define allergic response

Learning Objectives

- Describe body’s response to foreign substances
- Identify most common cause of death from anaphylaxis
Learning Objectives

- Discuss medications used to treat anaphylaxis:
  - Epinephrine
  - Epinephrine autoinjectors (EpiPen and EpiPen Jr)
  - Albuterol (Proventil, Ventolin)
  - Diphenhydramine hydrochloride (Benadryl)
  - Hydrocortisone (Solu-Cortef)
  - Methylprednisolone (Solu-Medrol)

Learning Objectives

- Demonstrate proper procedure for using an EpiPen

Introduction

- Hypersensitivity reaction to previously encountered antigen
- Potentially life-threatening events that affect multiple body systems
Introduction

- Anaphylactic shock
  - Rapid allergic reaction
  - Can result in death
  - Symptoms:
    - Shortness of breath
    - Syncope
    - Itching
    - Swelling of throat
    - Sudden drop in BP

Introduction

- Allergic responses stimulated most often by:
  - Penicillin
  - Insect bites and stings

- Must give optimal care and understand mechanism of pharmacologic treatment necessary for anaphylaxis

Overview of Anaphylaxis

- Immune response
  - Immune system selectively identifies targets for destruction
  - When functioning normally, body produces antibodies
    - Protective protein substances
    - Bind to antigens and neutralizes or remove them
    - Allow special killer cells to identify and destroy identified targets
Overview of Anaphylaxis

- Allergic response
  - Brought about by hypersensitivity to antigen out of proportion to its hazard to the body
  - Allergic response, not the antigen, is real threat
  - Allergens
    - Animals
    - Vegetables
    - Minerals
    - Medications
    - Foods
    - Dust

Overview of Anaphylaxis

- Mechanisms of anaphylactic reaction
  - When exposed to allergen, body releases chemicals:
    - Histamine
    - Serotonin
    - Bradykinin
    - Slow-reacting substance of anaphylaxis

Overview of Anaphylaxis

- Mechanisms of anaphylactic reaction
  - Allergic response:
    - Can be minor or severe
    - Can cause shock from respiratory and circulatory complications
    - Skin rashes
    - Hives
    - Itching
    - Redness
    - Edema
    - Edema of lips and eyelids
    - Watery eyes
Overview of Anaphylaxis

Mechanisms of anaphylactic reaction

- When patient has mild allergic response, assume potential for shock
  - Closely monitor so quick action can arrest or reverse anaphylaxis
  - Requires immediate intervention
- Severe complications can arise quickly and without warning

Body's responses to invading foreign substances:

- After foreign invader or material has been targeted, various cells attack invader
- Magnitude of chemical release distinguishes normal immune response from anaphylactic reaction
- Vasodilation results in a drop in systemic BP and decrease in peripheral tissue perfusion and O2 delivery
- Spasm of smooth muscle produces diarrhea, vomiting, and laryngospasm
- Increased capillary permeability results in airway edema
Overview of Anaphylaxis

- Mechanisms of anaphylactic reaction
  - Most patients show symptoms within minute to an hour after exposure
    - Faster response = more serious life threat
  - As condition progresses:
    - Laryngoedema causes airway obstruction
    - Tightness in chest
    - Shortness of breath
    - Lightheadedness
    - Decreased level of consciousness
    - Respiratory distress
    - Circulatory collapse

- When patient reports hoarseness or describes “full feeling,” assume patient is progressing toward life-threatening anaphylaxis
- History often confirms allergic response and anaphylaxis

Overview of Anaphylaxis

- Management
  - Rapid and thorough assessment of airway and breathing is priority
    - Assist as history is obtained
  - If airway is rapidly collapsing, consider intubation
    - Rapidly developing edema can make intubation impossible after airway obstructs
Overview of Anaphylaxis

- Management
  - Administer epinephrine 1:10,000 IV push
    - Catecholamine that stimulates alpha-adrenergic and beta-adrenergic receptors
    - Increases rate and force of heart contractions
    - Bronchiol edema is reduced by constriction of arterioles of bronchioles
    - Causes peripheral vasoconstriction

- Administer as quickly as possible
- Do not wait to start IV line
- 1:10,000 can be given through ET tube
- 1:1000 via Sub-Q or IM injection

- Once patients have significant allergic reaction, often prescribed an epinephrine autoinjector
  - Allows patients to inject themselves, even through clothing
  - Many EMS systems allow basic and intermediate providers to assist
Overview of Anaphylaxis

- Management
  - Use of EpiPen
    - Equipment needed:
      - EpiPen
      - Sharps
      - PPE

- Procedure:
  - Unscrew cap from carrying case and remove EpiPen
  - Black tip of EpiPen is where needle comes out
  - Hold EpiPen with black tip pointing downward
  - With the other hand, remove gray safety release on other end of EpiPen
  - Hold black tip near outer portion of the thigh

  - With swinging motion of your arm, jab EpiPen into outer portion of the thigh so that EpiPen clicks and unit is perpendicular to the thigh
  - Hold autoinjector in place for 10 sec
  - Remove autoinjector and massage area for 10 sec
Overview of Anaphylaxis

- Management
  - Maintain circulatory integrity
    - Infusion of crystalloids, normal saline, or Ringer lactate should be given.
    - Initial bolus of 1 to 2 L in patients with hypotension

- Second-line medications
  - Antihistamines
  - Corticosteroids
  - Bronchodilators
    - Albuterol (Proventil, Ventolin)
      - Direct-acting beta-adrenergic
      - Causes bronchodilation
      - Relaxes bronchial smooth muscle
Overview of Anaphylaxis

- Management
  - Second-line medications
    - Diphenhydramine hydrochloride (Benadryl)
      - Competes with histamine for H1 receptor sites
      - Has significant anticholinergic properties
      - Blocks effects of histamine
    - Hydrocortisone (Solu-Cortef)
      - Corticosteroid
      - Inflammatory properties
      - Treats allergic reactions, anaphylaxis, asthma, COPD
      - Prevents later complications of laryngoe德ema and urticaria
      - Used during extended transports as single dose
    - Methylprednisone (Solu-Medrol)
      - Corticosteroid
      - Decreases body's inflammatory response
      - Suppresses immune system
      - Treats severe anaphylaxis, asthma, COPD