Anaphylaxis & Intramuscular Injection (Class 12)

Anaphylaxis

- Definition - an exaggerated response of the immune system to a substance to which the body has been previously sensitized
- Reason - massive mediator release
- 1,500 deaths per year in the United States

- Immune system
  - A collection of cells, proteins, enzymes, etc. whose role is to protect the body from foreign material and organisms

- Antigen
  - Anything that the immune system will recognize as "foreign"
  - Everything not naturally occurring or present in the body is an antigen
    - Inert substances do not stimulate immune system
      - Titanium metal
      - Silicon
  - Some substances, particularly proteins prompt violent immune reactions
  - Auto-immune diseases
    - Rheumatoid arthritis
    - Crohn's disease

- Components of immune system
  - Antibodies
    - Proteins manufactured by the body
    - Very important role
    - Dual purpose
      - "Flags" foreign material for other immune system cells (white blood cells a/k/a "macrophages")
      - Prompts release of "mediators" when foreign material identified
        - Histamine
        - Leukotriene
        - Prostaglandin
        - Tryptase
    - Body creates antibodies to specific substances/organisms
    - Mediator release occurs when the antigen binds to antigen-specific immunoglobulin E (IgE) attached to previously sensitized basophils and mast cells

- Components of immune system (Cont.)
- Mast cells
  - Immunoglobulin E “IgE”
    - Antibody that is manufactured after first exposure to antigen which attaches to
      Mast cells and makes person especially sensitive to antigen if reintroduced into
      the body
  - Produce and release mediators so as to allow white blood cells to leave bloodstream
    and attack antigens in interstitial space
  - Mediator effects
    - Vasodilation (hypotension)
    - Bronchoconstriction (hypoxia)
    - Increases capillary permeability (edema & hypoxia secondary to airway
      obstruction)

- Causes of anaphylaxis
  - Evenomation
    - Insects
      - Hymenoptera
        - Bees, wasps & hornets
      - Ants
      - Biting flies
  - Drugs
    - Antibiotics
      - Penicillin and penicillin-like antibiotics are most common cause
      - 4 reactions per 10,000 patients treated with drug
    - Anesthetic agents
    - Diagnostic chemicals
    - Aspirin
    - Analgesics

- Causes of anaphylaxis (Cont.)
  - Foods
    - Protein rich foods
      - Eggs
      - Milk
      - Shellfish
      - Nuts
      - Meats
    - Foods containing sulfite additives

- Signs & symptoms
  - Generalized findings
    - Itchy, watery eyes
    - Headache
    - Runny nose
• Nausea
  - Skin
  • Patient may state he has a warm tingling feeling in the face, mouth, chest, feet and hands.
  • Itching
  • Welts/Hives
  • Red skin (flushing)
  • Swelling to face, neck, hands, feet and/or tongue

• Signs & symptoms (Cont.)
  - Respiratory system
  • Patient may state he feels a tightness in his throat/chest.
  • Cough
  • Rapid breathing
  • Labored breathing
  • Noisy breathing
  • Hoarseness (losing the voice)
  • Stridor
  • Wheezing (audible without stethoscope)

• Signs & symptoms (Cont.)
  - Cardiac
    • Tachycardia
    • Hypotension
  - Decreasing mental status
  - Presence of medic-alert tag

• Signs & symptoms (Cont.)
  - Assessment findings that reveal hypoperfusion OR respiratory distress indicate the presence of a severe allergic reaction meaning administration of Epinephrine is indicated
  - Said another way: hypotension, wheezing or stridor equals immediate need for epinephrine

• Treatment
  - Establish responsiveness
  - Airway
    • Positioning
      – Modified jaw thrust
      – Chin lift
• Adjuncts as needed
  – Nasal airway
  – Oral airway
  – PTL
• Suction as necessary
• Best treatment for airway issues is prompt administration of epinephrine
  – Will not immediately decrease airway edema, but will halt increase in edema

- Treatment (Cont.)
  - Breathing
    • High flow oxygen
      – Non-rebreathing mask @ 15 LPM
    • Bag-valve-mask assembled and ready
    • Ventilate or assist and supplement breathing as necessary
  - Circulation
    • Check and maintain appropriate pulse
    • Place venous constricting band between sting site and torso if stung on extremity
    • Apply cold pack if stung on face, neck or torso
    • IV normal saline or lactated ringer’s solution TKO using large bore needle
    • 20 cc/kg bolus if hypotensive

- Treatment (Cont.)
  - Wound care
    • Remove stinger
      – Continues to spasm for up to twenty minutes
      – Emits pheromones that attract additional bees
      – Use credit card
      – Scrape at right angle to skin
  - Patient positioning
    • Fowler’s
    • Semi-Fowler’s
    • Supine for CPR

- Treatment (Cont.)
  - Treat for shock
    • MAST, if necessary
      – MAY inflate abdomen
    • Trendelenburg, if necessary
    • Oxygen as above
    • Blankets
  - NPO (non per os)
  - Frequent vital signs
- Emergency transport, if necessary

Treatment (Cont.)
- If NO signs of respiratory distress or hypoperfusion
  • Continue with focused assessment
  • Monitor carefully
- If signs of respiratory distress OR hypoperfusion, administer epinephrine
  • Subcutaneous injection
  • Auto-injector
    - Medication name
      » Generic - Epinephrine
      » Trade - Adrenaline

Treatment (Cont.)
- Administer Epinephrine
  - Indications - must meet the following three criteria:
    » Emergency medical care for the treatment of the patient exhibiting the
      assessment findings of an allergic reaction having respiratory distress OR
      hypoperfusion
    » Medication is prescribed for this patient by a physician
    » Medical direction authorizes use for this patient
  - Contraindications - no contraindications when used in a life-threatening situation

Treatment (Cont.)
- Administer Epinephrine
  • Medication form - liquid administered via an automatically injectable needle and
    syringe system.
  • Dosage
    - Adult - one adult auto-injector (0.3 ml) or .01 ml/kg up to .3 ml
    - Infant and child - one infant/child auto-injector (0.15 ml) or .01 ml/kg up to .15
      ml
    - At 1:1,000 concentration, .1mg = .1ml
  • Actions
    - Dilates the bronchioles.
    - Constricts blood vessels.
    - Decreases capillary permeability, but will not immediately reverse edema.

Treatment (Cont.)
- Administer Epinephrine
  • Side effects
- Tachycardia
- Excitability, anxiousness
- Muscular tremors
- Pallor
- Dizziness
- Chest pain
- Headache
- Nausea
- Vomiting

Re-assessment strategies following administration of epinephrine
- Continue focused assessment of airway, breathing and circulatory status
  - If patient condition continues to worsen (decreasing mental status, increasing breathing difficulty, decreasing blood pressure)
    - Obtain medical direction
      » Additional dose of epinephrine
      » Treat for shock (hypoperfusion)
      » Prepare to initiate Basic Cardiac Life support measures
      » CPR
      » AED
  - Repeat dose after 5 to 20 minutes if no improvement and medical control approves

Re-assessment strategies (Cont.)
- If patient condition improves, provide supportive care
  - Oxygen
  - Treat for shock (hypoperfusion)

Skills
- Subcutaneous Epinephrine Injection (Autoinjector)
  - Skills Manual pages 77 & 78
  - Video

Skills
- Subcutaneous Epinephrine Injection (Syringe)
  - Skills Manual pages 81 & 82
  - Video
Intramuscular (IM) Injection

- IM Injection
  - I.M. injections deposit up to 2 ml of medication deep into the Deltoid muscle tissue.
  - Because muscle tissue has few sensory nerves, I.M. injection allows less painful administration of irritating drugs.
  - The site for an I.M. injection must be chosen carefully
  - I.M. injections shouldn't be administered at inflamed, edematous, or irritated sites or at sites that contain moles, birthmarks, scar tissue, or other lesions.
  - I.M. injections may be contraindicated in patients with edema, shock and during an acute myocardial infarction because these conditions impair peripheral absorption.
  - I.M. injections require sterile technique to maintain the integrity of muscle tissue.

- IM Injection (Cont.)
  - Find the lower edge of the acromium process and the point on the lateral arm in line with the axilla.
  - Insert the needle 1 to 2 inches (2.5 to 5 cm) below the acromium process, usually two or three fingerbreadths, at a 90-degree angle.
  - Typical injection: 0.5 ml (range: 0.5 to 2.0 ml).

- Administer Duodote
  - Indications - must meet the following three criteria:
    - Emergency medical care for the treatment of the patient exposed to nerve-poisoning agents or organophosphorous insecticides
    - Medication is prescribed for this patient by a physician
    - Medical direction authorizes use for this patient
  - Contraindications - none when used in a life-threatening situation

- Administer Duodote (Cont.)
  - Medication form - liquid administered via an autoinjector or syringe.
  - Dosage
    - 0.7 ml of atropine
    - 2.0 ml of pralidoxime chloride
    - MUST BE GIVEN SEPARATELY
      - Autoinjector administers each separately
  - Actions
    - When an individual is poisoned by a chemical nerve agent, the agent binds to enzymes in the body which cause neurotransmitters to over-stimulate nerves, muscles and glands resulting in an over-secretion of mucus in the respiratory tract and can eventually lead to suffocation due to the build-up of mucus. Atropine
competes with the over-stimulating neurotransmitters, blocking the effects until normal function can return to the nerves, muscles and glands. The pralidoxime chloride helps restore function of the nerves, muscles and glands.

- Administer Duodote (Cont.)
  - Side effects
    - (atropine) dryness of the mouth, blurred vision, dry eyes, photophobia, confusion, headache, dizziness, tachycardia, palpitations, flushing, abdominal pain, abdominal distention, nausea and vomiting
    - (pralidoxime chloride) blurred vision, diplopia, dizziness, headache, drowsiness, nausea, tachycardia, increased systolic and diastolic blood pressure, muscular weakness, dry mouth, emesis, rash, hyperventilation

- Skill
  - Intramuscular Injection (Syringe)
  - Skills Manual pages 83 & 84
  - Video