Chapter 29

Drugs for Shock

Shock

- Inadequate blood flow to meet body's needs
- Considered medical emergency
- Can lead to irreversible organ damage and death

Types of Shock

- Classified by
  - Underlying pathological condition
  - Organ system causing the disease
- Cardiogenic, hypovolemic, neurogenic, septic, and anaphylactic

Definition of Types of Shock

- Cardiogenic shock: from failure of heart to pump sufficient blood
- Hypovolemic shock: from loss of blood volume
- Neurogenic shock: from vasodilation due to changes in autonomic nervous system

Definition of Types of Shock (continued)

- Septic shock
  - Multiple-organ dysfunction
  - Result of pathogenic organisms in blood
  - Causes vasodilation and changes in permeability of capillaries
  - Often precursor to acute respiratory distress syndrome (ARDS) and disseminated intravascular coagulation (DIC)
Definition of Types of Shock (continued)

- Anaphylactic shock: acute allergic reaction

Shock

- Collection of nonspecific signs and symptoms
- Affects the nervous, renal, cardiovascular systems

Shock

- Most types have symptoms in common
  - Pale, cold, clammy skin
  - Feeling of sickness and weakness
  - Restlessness, anxiety, confusion, depression, apathy
  - Unconsciousness
  - Thirst

Physiological Problems of Shock

- Cardiovascular system fails to send enough blood to vital organs
  - Heart and brain affected early
  - Low BP and diminished cardiac output
  - Heart rate is rapid and weak
  - Breathing is shallow and rapid
### Initial Treatment Priorities

- **ABCs of life support**
  - Airway
  - Breathing
  - Circulation
- Identify underlying cause; then start more specific treatment
- Keep client warm and quiet
- Offer psychological support

### Pharmacotherapy Goals

- Restore normal fluid volume and composition
- Maintain adequate blood pressure
- For anaphylaxis: prevent or stop hypersensitive inflammatory response

### Immediate Fluid Replacement

- Essential with significant fluid loss
- Causes of fluid loss include
  - Hemorrhage; extensive burns; severe dehydration
  - Persistent vomiting or diarrhea; intensive diuretic therapy

### Hypovolemic Shock

- Three categories of fluid-replacement agents used
  - Blood
  - Colloids
  - Crystalloids

### Whole Blood

- Indicated for treatment of acute, massive blood loss
  - 30% or more of total volume
- Supply depends on donors
- Requires careful cross-matching
- Can transmit infections such as hepatitis or HIV

### Colloids

- Expand plasma volume and maintain blood pressure
- Used when up to one-third of adult client’s blood volume lost
- Stay suspended in blood
Colloids

- Draw molecules from body’s cells and tissues into blood vessels
  - Oncotic pressure
- Examples: normal human serum albumin, plasma protein fraction, dextran, hetastarch

Crystalloids

- Replace lost fluids and electrolytes; increase urine output
- IV solutions cause movement of fluid between blood and body’s cells.
- Normal saline, lactated Ringer’s, hypertonic saline, and 5% dextrose in water

Anaphylaxis

- Serious hypersensitivity response to allergen
- May be caused by common drugs
  - Penicillins, cephalosporins
  - Nonsteroidal anti-inflammatory drugs (NSAIDs)
  - ACE inhibitors

Signs and Symptoms of Anaphylaxis

- Periorbital edema, urticaria, wheezing and difficult breathing
- Other signs of shock
  - Palpitations, chest pain, nausea, vomiting
  - Sweating, weakness, dizziness, confusion
  - Blurred vision, headache, anxiety
  - Sense of impending doom

Treatment of Anaphylaxis

- Sympathomimetics, antihistamines, glucocorticoids used
- Therapy is symptomatic
  - To support cardiovascular system
  - To prevent further hyperreaction of immune system
Treatment of Anaphylaxis (continued)

- Give oxygen immediately
- Antihistamine—prevents release of histamine
- Bronchodilator—relieves shortness of breath
- Corticosteroids—suppresses inflammation

Fluid-Replacement Agent/Colloid

- **Prototype drug**: normal serum albumin (Albuminar, Albutein)
- **Mechanism of action**: to maintain plasma osmotic pressure and transport substances through blood
- **Primary use**: restoration of plasma volume and blood proteins
- **Adverse effects**: allergies and protein overload

Vasoconstrictors/ Sympathomimetics

- **Prototype drug**: norepinephrine (Levaterenol, Levophed)
- **Mechanism of action**: to act directly on alpha-adrenergic receptors to raise blood pressure; also has positive inotropic effects
- **Primary use**: to treat acute shock and cardiac arrest
- **Adverse effects**: tachycardia, bradycardia, and hypertension

Inotropic Agents

- **Prototype drug**: dopamine (Dopastat, Inotropin)
- **Mechanism of action**: is dose dependent; low doses = dopaminergic effect, high doses = beta-adrenergic effect
- **Primary use**: to treat hypervolemic and cardiogenic shock
- **Adverse effects**: dysrhythmias, hypertension, gangrene

Dopamine Animation

Click here to view an animation on the topic of dopamine.

Sympathomimetic/Anaphylaxis

- **Prototype drug**: epinephrine (Adrenalin)
- **Mechanism of action**: for use as nonselective adrenergic agonist
- **Primary use**: to treat anaphylaxis, shock, cardiac arrest
- **Adverse effects**: hypertension and dysrhythmias
Epinephrine Animation

Click here to view an animation on the topic of epinephrine.

Drugs for Shock—Fluid Replacement

• Blood or blood products
  – May be administered to restore fluid volume
  – Whole blood for acute, massive blood loss
    (more than 30% of total volume)
  – Replace plasma volume and supply red blood cells
  – Components
    • Whole blood, plasma protein fraction
    • Fresh-frozen plasma, packed red blood cells

Colloid Agents

• Mechanism of action: to maintain plasma osmotic pressure; transport substances through blood
• Primary use: restoration of plasma volume and blood proteins

Colloid Agents

• Examples of blood colloids: normal human serum albumin, plasma protein fraction, serum globulins
• Examples of nonblood-product colloids: dextran (40, 70, and high–molecular weight) and hetastarch (Hespan)

Crystalloids

• Intravenous solutions that contain electrolytes
• Concentrations resembling those of plasma
• Mechanism of action: can readily leave blood and enter cells

Crystalloids

• Primary use: to replace fluids that have been lost and to promote urine output
• Examples: normal saline, lactated Ringer’s, Plasmalyte, and hypertonic saline
Vasoconstrictors for Shock

- Strongly activate alpha-adrenergic receptors in arterioles
- Mechanism of action: to act directly on alpha-adrenergic receptors to raise blood pressure
- Positive inotropic effects

Vasoconstrictors for Shock

- Primary use: to treat acute shock and cardiac arrest
- Example: norepinephrine

Inotropic Drugs for Shock

- Increases strength of myocardial contraction, increases cardiac output
- Mechanism of action is dose dependent
  - Low doses have dopaminergic effect
  - High doses have beta-adrenergic effect

Inotropic Drugs for Shock

- Primary use: to treat hypervolemic and cardiogenic shock
- Examples: digoxin, dobutamine, and dopamine

Drugs for Anaphylaxis

- Symptomatic: support cardiovascular system to prevent further hyperresponse
- Epinephrine is initial drug of choice
  - Rapidly reverses hypotension
- Mechanism of action: as nonselective adrenergic agonist (sympathomimetic)
- Other medications
  - Antihistamines, bronchodilators, and corticosteroids

Drug Therapy for Shock

- Assessment
  - Complete health history
  - Assess breath sounds and vital signs
  - Assess renal function (BUN and creatinine)
  - Assess level of consciousness
  - Assess knowledge level about medications
Drug Therapy for Shock (continued)

- Nursing diagnoses
  - Risk for injury
  - Excess fluid volume
  - Ineffective tissue perfusion
  - Knowledge deficit, related to drug therapy

Drug Therapy for Shock (continued)

- Planning—client will
  - Report difficulty breathing, itching, or flushing
  - Maintain urine output of at least 50 ml/h
  - Maintain systolic blood pressure greater than 90 mm Hg
  - Remain alert and oriented
  - Demonstrate understanding of drug’s action

Drug Therapy for Shock (continued)

- Implementation
  - Monitor respiratory status
  - Monitor intake and output for changes in renal function
  - Monitor electrolytes
  - Observe client for signs of allergic reactions
  - Observe urine for changes in color

Drug Therapy for Shock (continued)

- Evaluation—client
  - Is free of itching, flushing, and shortness of breath
  - Maintains urine output of at least 50 ml/h
  - Has systolic blood pressure greater than 90 mm Hg
  - Is alert and oriented
  - Verbalizes understanding of drug’s action

Vasoconstrictors for Shock

Table 29.3 Vasoconstrictors for Shock

Inotropic Drugs for Shock

Table 29.4 Inotropic Drugs for Shock