Introductory Clinical Pharmacology

Chapter 40
Antianginal and Peripheral Vasodilating Drugs
Angina

• Stable
  – Triggered by increase in physical activity.
  – Etiology: CAD
  – Treatment: reduce oxygen demand
  – Drugs to treat: nitrates, B-blockers, Ca+ channel blockers

• Variant angina
  – Etiology: coronary artery spasm
  – AKA vasospastic angina or Prinzmetal’s angina
  – Treatment: increase oxygen supply
  – Drugs: Ca+ channel blockers, nitrates
Normal cross-section of artery

Tear in artery wall

Fatty material is deposited in vessel wall

Narrowed artery becomes blocked by a blood clot
Insufficient blood flow to the heart muscle from narrowing of coronary artery may cause chest pain.
Unstable Angina

• Medical emergency
• Result from severe CAD
• Greater risk of death than stable angina, less than MI
Antianginal Drugs: Actions

- Nitrates: Act by relaxing the smooth muscle layer of blood vessels, increasing the lumen of the artery or arteriole, and increasing the amount of blood flowing through the vessels.

- Calcium channel blockers: Act by inhibiting the movement of calcium ions across cell membranes of cardiac and arterial muscle cells; effects on the heart: slowing the conduction velocity of the cardiac impulse; depression of myocardial contractility; dilating coronary arteries and arterioles.
Antianginal Drugs: Uses

- **Nitrates**: Relieve pain of acute anginal attack; prevent angina attacks; control perioperative hypertension associated with surgical procedures.

- **Calcium channel blocker**: Anginal pain associated with certain forms of angina, such as vasospastic angina; chronic stable angina; hypertension.
Antianginal: Adverse Reactions

- Nitrates
  - CNS reactions: Headache (may be severe and persistent), dizziness, weakness, and restlessness
  - Other body system reactions: Hypotension, flushing, and rash

- Calcium channel blockers
  - CNS reactions: Dizziness, light-headedness, headache, nervousness, asthenia (loss of muscular strength), and fatigue
Antianginal: Adverse Reactions

- Calcium channel blockers (cont’d)
  - Gastrointestinal reactions: Nausea, constipation, and abdominal discomfort
  - Cardiovascular reactions: Peripheral edema, hypotension, arrhythmias, and bradycardia
  - Other body system reactions: Rash, flushing, nasal congestion, and cough
Antianginal: Contraindications and Precautions

• Nitrates
  - Contraindicated: In patients with known hypersensitivity to the drugs, severe anemia, closed angle glaucoma, postural hypertension, early myocardial infarction (MI), head trauma, cerebral hemorrhage (may increase intracranial hemorrhage), allergy to adhesive (transdermal system), or constrictive pericarditis; amyl nitrite: pregnancy
Antianginal: Contraindications and Precautions

- **Nitrates (cont’d)**
  - Precautions: In patients with severe hepatic or renal disease; severe head trauma; acute MI; hypothyroidism; during pregnancy and lactation

- **Calcium channel blockers**
  - Contraindicated: Patients who are hypersensitive to the drug; those with sick sinus syndrome; second- or third-degree atrioventricular (AV) block; hypotension (systolic pressure less than 90 mm Hg); ventricular dysfunction; cardiogenic shock
Antianginal: Contraindications, Precautions, and Interactions

- Calcium channels blockers (cont’d)
  - Used with caution in patients with congestive heart failure; hypotension; renal impairment; hepatic impairment; during pregnancy and lactation

- Interactions
  - Nitrate interacts with alcohol (severe hypotension and cardiovascular collapse may occur); aspirin (increased nitrate plasma concentrations and action may occur); calcium channel blockers (increased symptomatic orthostatic hypotension); dihydroergotamine (increased risk of hypertension and decreased antianginal effect); heparin (decreased effect of heparin)
Antianginal: Interactions (cont’d)

- Calcium channel blockers interact with:
  - cimetidine or ranitidine (increased effects of calcium channel blockers);
  - theophylline (increased pharmacologic and toxic effects of theophylline);
  - St. John’s wort (reduced serum concentrations of calcium channel blocker, e.g., nifedipine);
  - digoxin (increased risk for digitalis toxicity);
  - rifampin (decreased effect of calcium channel blocker)
Nursing Process: Assessment

• Preadministration assessment
  
  - Before administering an antianginal drug, obtain and record a thorough description of the patient’s anginal pain as well as a history of allergy to the nitrates or calcium channel blockers and of other disease processes that would contraindicate administration of the drug
  
  - Assess the physical appearance of the patient, auscultate the lungs for adventitious sounds, and obtain a baseline ECG and vital signs
Nursing Process: Assessment

- Ongoing assessment
  - Monitor the patient for the frequency and severity of any episodes of anginal pain; report to the primary health care provider any chest pain that does not respond to three doses of nitroglycerin given every 5 minutes for 15 minutes; take the patient’s vital signs before administration and frequently during administration; assess patients receiving the calcium channel blockers for signs of CHF: dyspnea, weight gain, peripheral edema, abnormal lung sounds (crackles/rales), and jugular vein distention
Nursing Process: Planning

• Expected outcomes for the patient depend on the specific reason for administration of an antianginal drug, but may include:
  – Optimal response to drug therapy
  – Meeting of patient needs related to the management of common adverse drug reactions
  – Understanding of the post-discharge drug regimen
Nursing Process: Implementation

• Promoting an optimal response to therapy

  – Nitrates: Administered by the sublingual (under the tongue), buccal (between the cheek and gum), oral, IV, or transdermal route; nitroglycerin administered by the sublingual, buccal, topical, transdermal, oral, or IV route; if the buccal form of nitroglycerin prescribed, instruct the patient to place the buccal tablet between the cheek and gum or between the upper lip and gum above the incisors and allow it to dissolve
Nursing Process: Implementation

• Promoting an optimal response to therapy
  
  – Nitrates (cont’d): Nitroglycerin also administered by metered spray canister to abort acute anginal attack; instruct patient to call nurse if pain not relieved in three doses

  • Administering topical nitroglycerin: Dose measured in inches or millimeters; before measuring and applying the drug, obtain patient’s blood pressure and pulse rate and compare with baseline and previous vital signs; if blood pressure lower or pulse rate higher, contact primary health care provider before applying
Nursing Process: Implementation

- Promoting an optimal response to therapy
  - Nitrates

  - Administering topical nitroglycerin (cont’d): Applicator paper supplied with drug; one paper per application; express the prescribed amount of ointment onto paper while holding the paper; remove paper from previous administration and cleanse area; rotate application sites to prevent inflammation of skin
Nursing Process: Implementation

- Promoting an optimal response to therapy
  - Nitrates (cont’d)
    - Administering transdermal nitroglycerin: Convenient and easier to use; drug absorbed through skin; has the drug impregnated in a pad; tolerance to vascular and anginal effects of nitrates in patients taking higher dosages: prescribe longer-acting products; on dosing schedules
Nursing Process: Implementation

- Promoting an optimal response to therapy
  - Nitrates (cont’d)
    - Administering transdermal nitroglycerin (cont’d): Patients using patches prone to tolerance – nitroglycerin released at constant rate, steady plasma concentration maintained; when applying transdermal system: inspect skin site – dry, free of hair, and not subject to excessive rubbing or movement; discuss the nursing interventions when applying transdermal system on the patient
Nursing Process: Implementation

• Promoting an optimal response to therapy
  – Nitrates (cont’d)

• Administering oral nitroglycerin: Available as tablet that is swallowed; provide to patient on empty stomach, unless ordered otherwise; if nausea occurs after administration – notify the health care provider; taking tablet or capsule with food ordered to relieve nausea; due to tolerance PHCP may prescribe short acting 2-3 times day until 7 PM and long acting twice daily
Nursing Process: Implementation

• Promoting an optimal response to therapy
  - Nitrates (cont’d)

• Administering IV nitroglycerin: Diluted in normal saline solution or in water by continuous infusion using infusion pump to ensure rate; by using glass IV bottles and sets provided by manufacturer; regulate dosage according to patient’s response and as per PHCP’s instruction
Nursing Process: Implementation

• Promoting an optimal response to therapy (cont’d)
  – Calcium channel blockers: Taken without regard to meals, unless GI upset occurs, then give with meals; verapamil and bepridil cause gastric upset, so give with meals; verapamil tablets opened and sprinkled on foods or mixed in liquids; patient with difficulty swallowing diltiazem: tablets crushed and mixed with food or liquid
Nursing Process: Implementation

- Monitoring and managing patient needs
  - Risk for injury: Assist patient having episodes of postural hypotension with all ambulatory activities; instruct the patient to take the drug in the sitting or supine position and keep the position until symptoms disappear; monitor blood pressure frequently in patient with dizziness and light-headedness
  - Pain: Evaluate response to therapy by questioning about anginal pains; pain relieved entirely, less intense or frequent, or occurs with prolonged exercise; record information on patient’s chart – helps in future therapy and making dosage adjustments
Nursing Process: Implementation

• Educating the patient and family
  – Patient and family should have a thorough understanding of treatment of chest pains with an antianginal drug; explain the therapeutic regimen to the patient; adapt the teaching plan to the type of antianginal drug prescribed
Nursing Process: Evaluation

• The therapeutic effect is achieved and pain is relieved

• Adverse reactions are identified, reported to the primary health care provider, and managed successfully through nursing interventions

• The patient verbalizes an understanding of the treatment modalities

• The patient and family demonstrate an understanding of the drug regimen
Peripheral Vasodilating Drugs: Actions and Uses

- **Actions:** Act on the smooth muscle layers of peripheral blood vessel, blocking alpha-adrenergic nerve and stimulating beta-adrenergic nerves; inhibit platelet aggregation and dilate vascular beds, particularly the femoral area.

- **Uses:** Treating peripheral vascular disease, symptoms associated with cerebral vascular insufficiency, circulatory disturbance of the inner ear.
  - Intermittent claudication is a group of symptoms characterized by pain in calf muscle of one or both legs, caused by walking and relieved by rest; cilostazol, a phosphodiesterase II inhibitor, is used to treat intermittent claudication.
Peripheral Vasodilating Drugs: Adverse Reactions and Contraindications

- CNS reactions: Hypotension; physiologic increase in the pulse rate (tachycardia); headache; excessive sedation

- Other reactions: Nausea; abdominal distress, flushing of the skin, which can range from mild to moderately severe; rash; and sweating

- Contraindicated: In patients with known hypersensitivity to the drug, women in the immediate postpartum period, patients with arterial bleeding; cilostazol contraindicated in patient with CHF
Peripheral Vasodilating Drugs: Precautions and Interactions

- Used cautiously in patients with bleeding tendencies, severe cerebrovascular or cardiovascular disease, after a myocardial infarction, and during pregnancy
- There are no significant drug–drug interactions
Nursing Process: Assessment

• Preadministration assessment
  – Obtain the history of the patient’s symptoms before administering the first dose; physical assessment is based on patient’s diagnosis
  – Cerebral vascular disease: Evaluate patient’s mental status; peripheral vascular disorder – examine the involved area for general appearance, color of skin and evidence of drying or scaling, note the skin temperature of the involved area and record the finding
Nursing Process: Assessment

- Preadministration assessment (cont’d)
  - Palpate the peripheral pulses of the affected extremities and record the strength and amplitude of pulses; for patients taking cilostazol for intermittent claudication, a "baseline walking distance" is assessed to monitor drug effectiveness

- Ongoing assessment
  - Therapeutic results obtained may not be immediate; assess involved extremities for change in skin color and temperature; monitor blood pressure and pulse one or two times daily; drug taken for intermittent claudication – assess patient to determine increased walking capacity without leg pain
Nursing Process: Diagnosis and Planning

• Diagnosis: Common diagnosis related to peripheral vasodilator therapy is risk of injury related to hypotension, dizziness, and light-headedness

• Planning: Expected outcome is relief of pain, management of common adverse drug reactions, absence of injury, and an understanding of and compliance with the prescribed therapeutic regimen
Nursing Process: Implementation

- Promoting an optimal response to therapy: Positive result of therapy is decrease in pain, discomfort, and cramping; increased warmth in the extremities; and an increase in amplitude of the peripheral pulses; encourage patient to follow prescribed drug regimen and PHCP’s recommendations regarding additional methods to treat the disorder; examine the effected areas at each visit; in case of cilostazol – drug taken 30 minutes before or 2 hours after meals; drug not taken with grape fruit juice – increased blood concentration
Nursing Process: Implementation

• Monitoring and managing patient needs
  – Risk for injury: During therapy, some patients experience dizziness and light-headedness; assist the patient with all ambulatory activities and instruct the patient to ask for help; encourage the patient to dangle the leg before getting out of bed

• Educating the patient and family: Encourage patient to follow prescribed drug regimen and PHCP’s recommendations regarding additional methods to treat the disorder
Nursing Process: Evaluation

- The therapeutic effect is achieved and pain is relieved
- Adverse reactions are identified, reported to the primary health care provider, and managed successfully through appropriate nursing interventions
- No evidence of injury is seen
- The patient and family demonstrate an understanding of the drug regimen
- The patient verbalizes the importance of complying with the prescribed therapeutic regimen
True/False

Peripheral vasodilators act by blocking the beta-adrenergic nerves and stimulating the alpha-adrenergic nerves.
Abnormalities of the vascular endothelium may cause vasoconstriction, inflammation, and thrombolytic activity.
Prior to administering peripheral vasodilators, the nurse should assess the peripheral pulses of the affected limb for amplitude and strength.
Amlodipine and nifedipine are nitrates used in treating peripheral vascular diseases.
Peripheral edema, arrhythmia, bradycardia, and hypotension are the cardiovascular adverse effects of calcium channel blockers.

Fill-in-the-Blank

Amyl ______________ is contraindicated in pregnancy.
Cilostazol is a ______________ II inhibitor used to treat intermittent claudication.
When administering antianginal drugs, the health care provider should be notified if the ______________ blood pressure falls below 90 mmHg.
Hypotension and paradoxical ______________ may develop as adverse effects occurring with the use of calcium channel blockers.
Nitrates can be administered through the ______________ route, wherein the tablet is placed between the cheek and the gums.