Chapter 12
Hypertensive Emergencies

Learning Objectives

- Define hypertensive urgency and hypertensive emergency

Learning Objectives

- Discuss use of medications for treatment of hypertensive encephalopathy, hypertensive intracranial hemorrhage, and pulmonary edema with hypertension:
  - Esmolol (Brevibloc)
  - Nicardipine (Cardene)
  - Furosemide (Lasix)
  - Sodium nitroprusside (Nipride)
  - Labetalol (Trandate, Normodyne)
Learning Objectives

- Discuss use of aspirin and nitroglycerin (Nitrolingual, NitroQuick, Nitro-Dur) in treatment of myocardial ischemia with hypertension

- Discuss medications used in treatment of preeclampsia and eclampsia:
  - Magnesium sulfate
  - Hydralazine (Apresoline)

Learning Objectives

- Discuss medications used in treatment of hypertension with seizure:
  - Diazepam (Valium)
  - Phentolamine (Regitine)

Introduction

- More than 50 million people in United States have hypertension

- Known as the “silent killer”
  - No symptoms until condition advances to point of damaging organs

- Requires rapid identification and management
Introduction

- Hypertension
  - High BP
  - No identifiable cause
  - Other identifiable causes:
    - Kidney disease
    - Arterial disease
    - Steroids
    - Some endocrine tumors

Introduction

- Systolic hypertension is dangerous for elderly
  - Can lead to stroke

- Treatment is long term and requires multiple drug therapies

- Hypertensive urgency
  - Severe elevation of BP without evidence of organ damage

Introduction

- Hypertensive emergency
  - Malignant hypertension
  - Severe elevation of BP with evidence of end-organ damage
    - Kidneys
    - Heart
    - Brain
Introduction

- Hypertensive emergency
  - Presentation
    - Headache
    - Visual changes
    - Altered level of consciousness
    - Heart failure

- Specific emergencies:
  - Hypertensive encephalopathy
  - Hypertensive intracranial hemorrhage
  - Pulmonary edema with hypertension
  - Myocardial ischemia with hypertension
  - Preeclampsia and eclampsia

Overview of Hypertensive Emergencies

- Hypertensive encephalopathy
  - If not treated rapidly, can result in coma or death
  - Acute onset and reversible
  - Severe headache, vomiting, and altered mental status
  - Intracranial bleeds are caused by a rupture of a blood vessel from elevated BP
    - Confirmed by physical examination and history
Overview of Hypertensive Emergencies

- Hypertensive encephalopathy
  - Findings:
    - History of hypertension
    - Abrupt cessation of antihypertensive medication
    - Use of MAO phenelzine (Nardil)
  - Physical findings:
    - Elevated BP
    - Pulmonary rales
    - Altered mental status
  - When determining what pharmacologic agent, consider the cause

Overview of Hypertensive Emergencies

- Management
  - Do not reduce BP to normal levels
    - Too-rapid reduction can cause ischemia of the brain or retina
  - Reduce diastolic BP by 10% to 15% or to 110 mm Hg over 30 to 60 min
  - Drugs vary by cause of the BP increase

- Nitroglycerin
  - Potent venodilator
  - Arterial dilator only at high doses
  - Decreases blood returning to right side of the heart, which decreases cardiac preload
    - Decreases cardiac output
  - If patient has decreased blood flow to brain, decreased cardiac output is undesirable
Overview of Hypertensive Emergencies

- Management
  - If affected organ is the brain with possible stroke, use either a beta blocker or nicardipine (Cardene)
    - Esmolol (Brevibloc)
      - Short-acting beta blocker
      - Has little effect on BP of patients who are not hypertensive
      - Short half-life of 9 min
      - If after administration BP is too low, effect will not be prolonged

Overview of Hypertensive Emergencies

- Management
  - Nicardipine (Cardene)
    - Calcium channel blocker
    - Rapid onset of action
    - Lack of toxic metabolites
    - Ease of titration to desired effect
    - Effects resemble those of nitroprusside in terms of onset, duration, offset of action
    - Used with severe hypertension with or without target-organ damage

Overview of Hypertensive Emergencies

- Management
  - Furosemide (Lasix)
    - Potent diuretic
      - "Water pill"
      - Help reduce circulating intravascular volume by promoting an increase in urine production of the kidney
      - Diuresis
      - Blocks salt and fluid reabsorption in the kidney
Overview of Hypertensive Emergencies

- Management
  - Sodium nitroprusside (Nipride)
    - Onset of action is within 1 min
    - Action is quickly terminated when infusion is discontinued
    - Dilates both arteries and veins
    - Pressure receptors in walls of some blood vessels sense drop in BP and compensate by increasing heart rate
    - Can increase ICP

Overview of Hypertensive Emergencies

- Management
  - Labetalol (Trandate, Normodyne)
    - Half-life of 5 to 8 hours
    - Selective alpha1 blocker
    - Nonselective beta blocker
    - Decreases BP
    - Decreases heart rate, contractility, BP
    - First choice for intracranial bleeds
    - More safe than nitroprusside because it does not cause rapid and uncontrolled BP drop

Overview of Myocardial Ischemia with Hypertension

- Risk factors for AMI:
  - Diabetes
  - Hypertension with abrupt cessation of medications
  - Hyperlipidemia
  - Significant smoking history
Overview of Myocardial Ischemia with Hypertension

- Management
  - High-flow O₂
  - Initiation of IV
  - Cardiac monitor
  - 325-mg nonenteric coated aspirin
    - Will not treat hypertension
    - Will limit growth of a clot in coronary artery stent if it is occluded
    - Possibly preserves cardiac muscle

Overview of Myocardial Ischemia with Hypertension

- Management
  - Nitroglycerin
    - Lowers BP
    - Reduces tension of the myocardial wall
    - Cardiac workload decreases
    - Decreased O₂ demand
    - Heart muscle receives more oxygen-enriched blood flow

Overview of Myocardial Ischemia with Hypertension

- Management
  - Beta blockers
    - Reduce stress to injured heart
    - Improve survival with myocardial ischemia
    - Metoprolol
Overview of Preeclampsia and Eclampsia

- Eclampsia
  - Without treatment, possible death for mother and fetus

- Preeclampsia
  - High BP
  - Protein in urine
  - Edema of extremities

Overview of Preeclampsia and Eclampsia

- Preeclampsia
  - Becomes severe with:
    - Very high BP
    - Visual disturbances
    - Failing kidneys
    - Liver damage

Overview of Preeclampsia and Eclampsia

- Preeclampsia
  - Can become HELLP syndrome
    - Hemolysis
    - Elevated liver enzymes
    - Low platelet count
    - Potentially fatal to mother and her unborn child
Overview of Preeclampsia and Eclampsia

- Management
  - Magnesium sulfate
    - Acts as membrane stabilizer and cerebral vasodilator
    - Reduce chance of ischemia to brain tissue
    - Drug of choice for seizure control in eclampsia
  - Hydralazine (Apresoline)
    - Vasodilating agent
    - Selectively dilates arteries
    - Used in hypertensive crisis
    - Used for eclampsia and preeclampsia
    - Produces decrease in arterial pressure, so BP is lowered
    - Reflex tachycardia occurs after baroreceptors sense drop in pressure
    - Drug of choice for hypertension in eclampsia if magnesium fails
  - Nitroprusside
  - Labetalol
Overview of Hypertension with Seizure

- Cocaine
  - Sympathomimetic drug
  - Stimulates adrenergic nervous system
  - Present with overstimulation of the nervous system and potentially end-organ damage
  - Prone to:
    - Cardiac arrhythmias
    - Hypertensive emergencies
    - Chest pain

Overview of Hypertension with Seizure

- Management
  - Hypertensive emergencies caused by a drug are treated differently from others
  - Beta blockers are contraindicated because they can worsen coronary vasoconstriction

Overview of Hypertension with Seizure

- Management
  - Phentolamine (Regitine)
    - Both alpha1 and alpha2 blocker
    - Blocks receptors of the adrenergic sympathetic nervous system
    - Most commonly used in pheochromocytoma and states of excessive catecholamines
    - Drug of choice for cocaine-induced hypertension
Overview of Hypertension with Seizure

- Management
  - Diazepam (Valium)
    - Benzodiazepine used to help induce sleep, relieve anxiety, and relax muscle spasm
    - Promotes relaxation of muscle
    - Restores tone to peripheral nervous system inhibited by cocaine
    - Limits myocardial O₂ demand
    - Causes peripheral vasodilation and drop in BP

Questions?