Hypertension and Peripheral Vascular Disease

Week 39
Hypertension

Resting BP consistently $>140$ systolic or $>90$ diastolic
Epidemiology

- 74.5 million people over age 20
- One in three adults
- 30% do not know they are hypertensive
- Twice as frequent in blacks than in whites
- In 2006 the death rates per 100,000 population from high blood pressure were 15.6 for white males, 51.1 for black males, 14.3 for white females and 37.7 for black females.
Types

- Primary (essential) hypertension
- Secondary hypertension
Primary Hypertension

- 85 - 90% of hypertensives
- Idiopathic
- More common in blacks or with positive family history
- Worsened by increased sodium intake, stress, obesity, oral contraceptive use, or tobacco use
- Cannot be cured
Risk Factors

- **Modifiable**
  - Smoking
  - Obesity
  - Stress
  - Dyslipidemia
  - Atherosclerosis
  - Sedentary life style

- **Non-Modifiable**
  - Age
  - Family History
  - Diabetes
Signs/Symptoms

- Primary hypertension is asymptomatic until complications develop.
- Signs/Symptoms are non-specific.
  - Result from target organ involvement.
- Dizziness, flushed face, headache, fatigue, epistaxis, nervousness are not caused by uncomplicated hypertension.
Secondary Hypertension

- 10 - 15% of hypertensives
- Increased BP secondary to another disease process
- Causes:
  - Renal vascular or parenchymal disease
  - Adrenal gland disease
  - Thyroid gland disease
  - Aortic coarctation
  - Neurological disorders
- Small number curable with surgery
Hypertension Pathology

- Increased BP → inflammation, sclerosis of arteriolar walls → narrowing of vessels → decreased blood flow to major organs
- Left ventricular overwork → hypertrophy, CHF
- Nephrosclerosis → renal insufficiency, failure
Hypertension Pathology

- Coronary atherosclerosis → AMI
- Cerebral atherosclerosis → CVA
- Aortic atherosclerosis → Aortic aneurysm
- Retinal hemorrhage → Blindness
Diagnosis

- Repeat findings of BP < 140/90
- Patient history
  - Lifestyle and risk factors
  - Physical effects of HTN
  - EKG
  - Blood studies
  - CXR
HTN Medical Management

- **Life style modification**
  - Weight loss
  - Increased aerobic activity
  - Reduced sodium intake
  - Stop smoking
  - Limit alcohol intake
  - Relaxation, stress reduction
HTN Medical Management

Medications

- Diuretics
- Beta blockers
- Calcium antagonists
- Angiotensin converting enzyme inhibitors
- Angiotensin Receptor antagonists
Other Antihypertensive Agents

- Central Adrenergic Blockers
- Alpha adrenergic Receptor blockers
- Direct vasodilators
Medical management prevents or forestalls all complications

Patients must remain on drug therapy to control BP
Categories of Hypertension

- Hypertensive Emergency (Crisis)
  - acute \( \uparrow \) BP with sx/sx of end-organ injury

- Hypertensive Urgency
  - sustained DBP > 115 mm Hg w/o evidence of end-organ injury

- Mild Hypertension
  - DBP > 90 but < 115 mm Hg w/o symptoms

- Transient Hypertension
  - elevated due to an unrelated underlying condition
Hypertensive Crisis

Acute life-threatening increase in BP

Usually exceeds 200/130
Causes

- Sudden withdrawal of anti-hypertensives
- Increased salt intake
- Abnormal renal function
- Increase in sympathetic tone
  - Stress
  - Drugs
- Drug interactions
  - Monoamine oxidase inhibitors
- Toxemia of pregnancy
Signs/Symptoms

- Restlessness, confusion, AMS
- Vision disturbances
- Severe headache
- Nausea, vomiting
- Seizures
- Focal neurologic deficits
- Chest pain
- Dyspnea
- Pulmonary edema
Hypertensive Crisis Can Cause

- CVA
- CHF
- Pulmonary edema
- Angina pectoris
- AMI
- Aortic dissection
Hypertensive Crisis Management

Avoid crashing BP to hypotensive or normotensive levels!

Ischemia of vital organs may result!
DASH diet

Dietary approaches to Stop Hypertension

High intake of:
• Fruits and vegetables
• Low fat dairy products
• Whole grains
• Nuts
• Poultry and fish
• Potassium, magnesium, calcium
• Protein and fiber

Restrict intake of:
• Saturated fat, total fat, cholesterol
• Red meat
• Sugared drinks
• Salt and sodium
Syncope

Sudden, temporary loss of consciousness caused by inadequate cerebral perfusion
Vasovagal Syncope

- Simple fainting occurring when upright
- Increased vagal tone leads to peripheral vasodilation, bradycardia which lead to:
  - Decreased cardiac output
  - Decreased cerebral perfusion

Causes
- Fright, trauma, pain
- Pressure on carotid sinus (tight collar, shaving)
Cardiogenic Syncope

- Paroxysmal Tachyarrhythmias (atrial or ventricular)
- Bradyarrhythmias
  - Stokes-Adams attack
- Valvular disease
  - especially aortic stenosis
- Can occur in any position
Postural Syncope

Due to decreased BP on standing or sitting up

Orthostatic hypotension
Postural Syncope

- **Drugs - usually antihypertensives**
  - Diuretics
  - Vasodilators
  - Beta-blockers

- **Volume depletion**
  - Acute hemorrhage
  - Vomiting or diarrhea
  - Excessive diuretic use
  - Protracted sweating

- **Neuropathic diseases - diabetes**
Syncope History

- What were you doing when you fainted?
- Did you have any warning symptoms?
- Have you fainted before?
- Under what circumstances?
- Any history of cardiac disease?
- Any medications?
- Any other past medical history?
Syncope Management

- Supine position - possibly elevate lower extremities
  - Do not sit up or move to semi-sitting position quickly
- Airway
- Loosen tight clothing
Syncope Management

- Vital signs, Focused Hx & Physical exam
  - Assess for injuries sustained in fall
  - Attempt to identify cause
- Based on history/physical
  - ECG Monitor
  - Blood glucose check
  - Vascular access
Peripheral Vascular Disease

Peripheral Atherosclerotic Disease

Deep Vein Thrombophlebitis

Varicose Veins
Peripheral Vascular Disorders

- Ischemia - lack of blood supply to meet the needs of the tissue.

Causes of Ischemia

- vasoconstriction
- occlusion of lumen of the artery due to:
  - Atherosclerosis (fatty deposits)
  - Thrombosis/blood clot/embolism
    - s/s = coldness, pallor, or rubor (redness), cyanosis (blueness)
    - pain, changes in skin or nails
Age Related changes

- Arteriosclerosis
- Slowed heart rate
- Increased arrhythmias
- Decreased stroke volume
- Lowered ability to adapt to changes
Peripheral Arterial Occlusive Disease

- AKA: atherosclerosis obliterans, arterial insufficiency, peripheral vascular disease
- Characterized by pathologic changes in the arteries
- Common sites for occlusion: distal superficial femoral and popliteal arteries
Arteriosclerosis

Arteries become narrowed and blood flow decreases in arteriosclerosis.

Build up of fatty substances in the wall of the artery.
Peripheral Atherosclerosis

- Gradual, progressive disease
- Common in diabetics
- Thin, shiny skin
- Loss of hair on extremities
- Ulcers, gangrene may develop
Peripheral Atherosclerosis

- Intermittent Claudication
  - Deficient blood supply in exercising muscle
  - Pain, aching, cramps, weakness
  - Occurs in calf, thigh, hip, buttocks on walking
  - Relieved by rest (2 - 5 minutes)
Peripheral Atherosclerosis

Acute Arterial Occlusion

- Sudden blockage by embolism, plaque, thrombus
- Can result from vessel trauma
- The 5 Ps of acute occlusion
  - Pain, worsening over several hours
  - Pallor, poikilothermy (cool to touch)
  - Pulselessness
  - Paresthesias, loss of sensation
  - Paralysis
Physical Assessment of PVD

Arterial disease:
- acute pain, intermittent claudication (pain increases with exercise, relieved with rest), hair loss distant with occlusion, thick brittle nails
- Paresthesia, pallor when limb elevated, rubor when limb dependent (down), skin temp cold, diminished/weak/or absent pulses, no edema, but ulcers in distal areas, foot, toes, ankles, calves
Deep Vein Thrombophlebitis

- Inflammation of lower extremities, pelvic veins with clot formation
- Usually begins with calf veins
- Precipitating factors
  - Injury to venous endothelium
  - Hypercoagulability
  - Reduced blood flow (venous stasis)
DVT: Risk factors

- Bed rest
- Surgery under anesthesia if >40
- Leg trauma resulting in immobilization or casts
- Previous venous insufficiency
- Obesity
- Use of oral contraceptives
- Malignancy
Deep Vein Thrombophlebitis

Signs/Symptoms

- May be asymptomatic
- Pain, tenderness
- Fever, chills, malaise
- Edema, warmth, bluish-red color
- Pain on ankle dorsiflexion during straight leg lifting (Homan’s sign)
- Palpable “cord” in calf
  - clotted veins
Deep Vein Thrombophlebitis

May progress to pulmonary embolism!!!
Thromboangiitis obliterans

- AKA Buerger’s disease
- An inflammatory thrombotic disorder of arteries and veins
- Not an atherosclerotic process
- Unknown etiology
- Occurs only in smokers
- Signs and symptoms: intermittent claudication, rest pain, changes in skin color or temperature, cold sensitivity, ulceration, gangrene
TX-management of Buerger’s Disease

- No tobacco, avoid factors cause vasoconstriction
- Avoid becoming chilled, wear warm socks, boots, gloves, warm water baths
- Avoid prolonged standing- job changes? Nursing?
- Avoid injury/infection

- Exercising to stimulate circulation, however, as long as it doesn’t cause pain
- Buerger-Allen exercises
- Do not keep legs elevated-ischemia

- Vasodilators/anti-coagulants may help
Buerger-Allen exercises

- Elevate feet/legs till feet blanch (white), then lower them till turn red, then resting legs/feet in a horizontal position.
- Client performs exercises lying in bed or on sofa.
- Dr. tells client how often to perform them.

The patient is instructed to watch the changes in color blanching indicates inadequate blood supply-maintaining this position could harm tissues (death).
May instead walk, foot exercises help too.
Raynaud's Disease

- Intermittent constriction of arterioles
- Coldness, pain, pallor
- Etiology unknown
- Usually women 16-40
- Aggravated by stress
Varicose Veins

Dilated, elongated, tortuous superficial veins usually in lower extremities
Varicose Veins

Causes

- Congenital weakness/absence of venous valves
- Congenital weakness of venous walls
- Diseases of venous system (Deep thrombophlebitis)
- Prolonged venostasis (pregnancy, standing)
Varicose Veins

Signs/Symptoms

- May be asymptomatic
- Feeling of fatigue, heaviness
- Cramps at night
- Orthostatic edema
- Ulcer formation
Varicose Veins

Rupture may cause severe bleeding

Control with elevation and direct pressure
Pulmonary Embolism

Pathophysiology

- Pulmonary artery blocked

- Blood:
  - Does not pass alveoli
  - Does not exchange gases
Causes

Blood clots = most common cause

Virchow’s Triad

• Venous stasis – bed rest, immobility, casts, CHF
• Thrombophlebitis – vessel wall damage
• Hypercoagulability – Birth control pills, especially with smoking
Causes

- Air
- Amniotic fluid
- Fat particles
  - Long bone fracture – more quickly splinted, less chance of fat emboli
- Particulates from substance abuse
**Signs/Symptoms**

- Small Emboli
  - Dyspnea
  - Tachycardia
  - Tachypnea
Signs/Symptoms

Larger Emboli

- Respiratory difficulty
- Pleuritic pain
- Pleural rub
- Coughing
- Hemoptysis
- Localized Wheezing
Signs/Symptoms

Very Large Emboli

- Respiratory distress
- Central chest pain
- Distended neck veins
- Acute right heart failure
- Shock
- Cardiac arrest
There are NO findings specific to pulmonary embolism
Nursing Assessment

- Chief complaint and history of illness
- Past medical history
- Family history
Physical Examination

- Inspection
- Capillary refill
- Palpate
- Auscultate
Grading Edema

1: trace, 2mm- slight indent, normal contour
+2: moderate, 4mm- lasts longer than +1, fairly normal contour
+3: deep, 6mm- remains several seconds after pressing, obvious swelling
+4: very deep, 8mm+- remains for prolonged period (possibly minutes), gross swelling

* There is also Brawny edema in which fluid can no longer be displaced, hence, no pitting.
Diagnostic Tests and Procedures

- Ultrasonography
- Pressure measurements
- Treadmill test
- Angiography
Therapeutic measures

- Exercise
- Stress management
- Pain management
- Smoking cessation
- Anti-embolism stockings
- SCDs
- Positioning
- Thermography
Invasive therapeutics

- Embolectomy
- PCTA
- Endarterectomy
- Sympathectomy
- Vein ligation and stripping
- Sclerotherapy
Aneurysms

- An aneurysm is an abnormal widening or ballooning of a portion of an artery due to weakness in the wall of the blood vessel.
Saccular Aneurysm

Fusiform Aneurysm

Ruptured Aneurysm
Signs and symptoms vary with location
May be detected during routine physical exam or x-ray
Complications
Diagnosis
Venous Insufficiency

- Long standing pressure damages veins and valve
- Venous pressure causes edema
- RBCs leak into issue causing brown color
Lymphangitis

- Inflammation of lymphatic channels
- Primary characteristic is enlargement of lymph nodes with tenderness
- Treatment: antibiotics
Mr. Sparks is a 62 year old white male. He comes into your ED complaining of chest pain he says is probably just “something he ate.”

What do you do? What assessments do you make?
Mr. Dingleberry is admitted to the hospital with fever, headache and joint pain. During your physical assessment you note petechiae on his mouth and legs.

Reading his medical history you note that he had rheumatic fever as a child, as well as orthopedic surgery five years ago.