Medical-Surgical
Cardiovascular Diseases

Chapter 28 - 35

Introduction to CV System
Chapter 28

• A & P
  – An overview
  • Location

• Structures
  – Chambers
    • Atria
    • Ventricles
    • Septum
Muscle Layers

Valves
- Tricuspid
- Pulmonary
- Mitral
- Aortic
Cardiac Cycle

One heartbeat = one cardiac cycle

Systole and diastole = one heartbeat

Stroke Volume is the amount of blood ejected with each beat (Ejection Fraction)

Cardiac output = blood pumped in one minute

Conduction

- SA Node
- AV Node
- Bundle of His
- Purkinje Fibers

- Depolarization = contraction
- Repolarization = rest
• Regulation
  – Stimulated by the
    • Autonomic Nervous System
      – Sympathetic Nervous System
      – Parasympathetic Nervous System
    • Baroreceptors
      – Pressure-sensitive nerve endings
    • Chemoreceptors
      – pH, CO₂, O₂ levels

Assessment

• History
  • S & S of Problem Related by patient or family
  • Current Health Status in addition to presenting problem (Coexisting Problems)
  • Past Medical and Surgical History
  • Family Health History (Parents and Siblings)

• Physical Exam
  – Appearance
    • General
    • Skin
      • Edema, Weight and Jugular Veins
    – Pain
    – V/S
  – Cardiac Rhythm and Pulses
  – Sounds (Cardiac and Lung)
    • With/without cough: productive/nonproductive
    • Murmurs/Rubs
  – Mental Status
Diagnostic Test

• Lab Test
  – Chemistry
  – Enzymes and Isoenzymes
    • CK and CK-MB
    • Troponin
    • Myoglobin
    • LDH (LDH 1 and 2)
• CT
• Radiology

Echocardiogram

TEE
• Ambulatory Electrocardiogram
• Holter Recording
• Stress testing
  – Exercise
  – Drug

Figure 14-44: Electrophysiologic view of the heart.

Figure 14-45: EKG / ECG leads.
**Treadmill stress test**

**Cardiac Catheterization**

- A catch name for many test
- aka. S.C.A (Sine-Coronary Angiogram)
- Many test done in the Cath. Lab. or Interventional Cardiac Lab.
  - Arteriography
  - Angiography
  - Aortography
  - E.P.
  - R.F.A.
• Nursing Process
  – Anxiety
  – Knowledge Deficit
  – Pain
  – Activity Intolerance
  – Risk for Injury
Nutritional

- Hydration
- NPO
- Swallowing
- N & V

Pharmacology

- Allergies
  - Iodine
  - Seafood
- Other Medication
  - Prescription
  - OTC / Herbal
- Contrast Media

Gerontological

- Mental
  - More often affected by the decrease oxygenation to heart and brain
- Physical
  - Renal impairment
  - Increased freq. of arrhythmias
Questions?

- Anatomy
- Physiology
- Diagnostics
- Nursing Care

Infectious and Inflammatory Disorders of the Heart and Blood Vessels
Chapter 29

- Disorders of the Heart
  - Rheumatic Fever / Carditis
  - Infective Endocarditis a.k.a. Bacterial Endocarditis
- Look at the layer affected by the organism or inflammation
Rheumatic Carditis

Infective Endocarditis

Infective endocarditis is an infection of the heart chambers or valves.
Cause

- Inflammatory process or response
  - Viral
    - Most common cause
  - Bacterial
  - Fungal
  - Parasitic
  - Substance abuse
  - Radiation
  - Autoimmune disorder

S & S

- Related to causative illness
  - History of illness
  - Fever
  - Fatigue
  - Aches etc.
Diagnosis

• Blood test
  – Antistreptolysin O titer
  – ESR
  – C-Reactive Protein
  – Blood Cultures
    • For infective disorders
• ECG
• Echo’s
  – Structural changes observed

Treatments

• Medical
  – IV antibiotics
  – Rest
  – Medical treatment related to symptoms
    • Fever, Pain, Inflammation, and Prevention of clot formation
• Surgical
  – Repair of damage
• Prophylactic
  – Antibiotics prior to invasive therapy
Myocarditis

- **Causes**
  - Like rheumatic and endocarditis
- **S & S**
  - Sharp stabbing of squeezing
    - Similar to MI but relieved when sitting up
- **Diagnosis**
  - Myocardial biopsy only definitive test. Other test can be helpful but are only suggestive
- **Treatment**
  - Antibiotics
  - Rest
  - Cause and
  - Complications
Nurses Role

• Monitor
• Assess
• Support
• Goal
  – Reduce cardiac workload and promote healing

Complications

• Cardiomyopathy
  – r/t inflammatory response
• Heart Failure
  – r/t decreased cardiac output and circulation
• Arrhythmias
  – r/t ischemia, reduction in oxygenated blood

Cardiomyopathy

• A chronic condition
• Structural changes in heart muscle
• 5 types w/3 main
  – Dilated
  – Hypertrophic
  – Restrictive
  – Peripartum
  – Arrhythmogenic Right Ventricular
• Causes
  – Uncertain
  – Related or follows another medical problem
• Heart loses ability to pump blood efficiently
Cardiomyopathy

S & S

• General
  – Heart murmur
  – Forceful and palpable heart beat
• Some vary depending on type
  – Dilated -- most common
    • DOE and when lying down
    • Fatigue
    • Lower Extremity Edema
    • Palpitations and chest pain
  – Hypertrophic
    • Syncopy or near syncopy
    • Like dilated
    • Many asymptomatic
  – Restrictive – least common
    • Exertional dyspnea
    • Dependent edema, ascites, and hepatomegaly

Diagnosis

• Asymptomatic persons it’s found during other evaluations
  – Chest X-ray
  – ECG rest and stress (radionuclide)
• Definitive
  – Echo
  – Cardiac Catheterization
  – Biopsy
Treatment

• General
  – Pharmacologic
  – Dietary / Lifestyle
  – Pacemaker
  – Surgical

• Nursing Process
  – History
  – Education
    • Disease, diet, activity, medication, and lifestyle changes
  – Oxygenation
  – Medication
    • Diuretics, cardioglycosides and antihypertensives
    • Anti-arrhythmics, anticoagulants, anti-inflammatory
  – Support

Pericarditis

• Inflammation of the pericardium
• Secondary to another event
• Can contribute to tamponade or effusion
S & S
- Related to inflammatory response
- SOB chest heaviness
- Pain
  - Worse with breathing or moving
  - Relieved when sitting
- Friction Rub
- Dull / Distant heart sounds
- Altered Vital Signs
  - Fever
  - Rapid resp.
  - Severe hypotension
  - Weak pulse

Diagnosis
- ECG
- Echocardiogram

Treatment
- Depends on Cause
- Emergency – Cardiac tamponade
Nursing

- Problems related to inflammation
- Problems related to a decreased cardiac output.
- Problems related to breathing

- Major risk Cardiac Tamponade

Disorders of the Blood Vessels
Thrombophelebitis

Venous lining irritated or injured clot forms and disrupts blood flow further irritation causing inflammation
Inflammation accompanied by clot or thrombus formation

• Signs and Symptoms
  – Inflammation
  – Swelling
  – Redness
  – Pain - positive Homan’s sign

• Causes and Risk
  – Venous pooling
  – Venous irritation
  – Oral contraceptives
  – Smoking

Treatment

• Bed rest w/ elevation
  – DO NOT Massage
• Anticoagulant Table 29-2 page 450
• Surgery
  – Thrombectomy
  – Vena cava filter
Goal

• Prevention of emboli formation
  – Outside hospital
  – Inside hospital

Disorders of the Coronary and Peripheral Blood Vessels

Chapter 31

• Arteriosclerosis
  – Loss of elasticity or hardening

• Atherosclerosis
  – Narrowing of lumen
  May be Modifiable
• Occlusive Disorders of the Coronary Blood Vessels
  – Coronary Artery Disease
  – Myocardial Infarction

• Causes
  – Hyperlipidemia
  – Infection
  – Inflammation

• Assessment
  – S & S
    • Angina (Chart page 471 Table31-1)
      – Stable
      – Unstable
      – Variant

• Diagnosis
  – Lab
  – ECG

• Treatment
  – Behavior Modification
    • Lifestyle changes
  – Pharmacology
    • Nitrates
    • Calcium Channel Blockers
    • TPA
  – Invasive Procedures
    • PTCA w/ or w/o Stents
    • CABG
Atherectomy
Nurses Role

- Assessment
  - pain
- Administer Medications
- Education
  - Modifiable Risk Factors
  - Medication
  - Diagnostic Treatments/Procedures
- Monitor

Coronary Artery Bypass Graft
A procedure to bypass a blocked section of a coronary artery and deliver oxygen to the heart

MYOCARDIAL INFARCT

Zone of infarction
Zone of injury
Zone of ischemia
Types of MI's

- Wall damage
  - Transmural
  - Subendocardial
- Location
  - Anterior
  - Lateral
  - Septal
  - Inferior
  - Posterior
  - Any combination of these

Complications

- Dysrhythmias
- Shock
- Rupture
- Aneurysm
- Embolism/Thrombosis
- Pericarditis
- Mitral Insufficiency

Assessment

- S & S
  - Typical
    - Pain
      - Location
      - Quality
    - N/V
    - SOB
    - Diaphoresis
  - Atypical
    - Fatigue
    - N/V
    - Dizziness
• Diagnosis
  – Lab
    • Cardiac Enzymes and Iso’s (a.k.a. Cardiac Markers)
  – EKG

• Treatment
  • Thrombolytic
  • Symptomatic
  • Surgical
  • Rehabilitation

• Occlusive Disorders of Peripheral Blood Vessels
  – Raynaud’s Disease
  – Thrombosis, Phlebothrombosis, Embolism
  – Venous Insufficiency
• Disorders of Blood Vessel Walls
  – Varicose Veins
  – Aneurysms
Cardiac Dysrhythmias
Chapter 32

• SA Node
  – Bradycardia
  – Tachycardia
  – PAC’s
  – SVT (PAT)
  – Atrial Flutter
  – Atrial Fibrillation
PAC
• PAT
• Atrial Flutter

Atrial Fibrillation
• SVT

• Ventricles
  – PVC’s
  – Ventricular Tachycardia
  – Ventricular Fibrillation
• AV Node
  – Heart Blocks
• No Matter what you think you see on the monitor ALWAYS assess the patient FIRST!

Treatments of Dysrhythmias
• Drugs
• Elective Electrical Cardioversion
• Difibrillation
• Pacemakers
  – Transcutaneous
  – Implanted
• Radiofrequency Catheter Ablation (RFCA)
Valvular Disorders
Chapter 30

• Disorders of the Aortic Valve
  – Aortic Stenosis
  – Aortic Regurgitation
Disorders of the Mitral Valve

Mitral Stenosis
Mitral Regurgitation
Mitral Valve Prolapse
Undergoing Cardiovascular Surgery
Chapter 35

- Cardiac Procedures
  - Myocardial Revascularization
    - Conventional
    - Off-Pump
    - Minimally Invasive
    - Port Access
  - Valvular Repairs
  - Ventricular Repairs
  - Trauma
  - Transplants

- Central or Peripheral Vascular Procedures
  - Grafts
  - Embolectomy and Thrombectomy
  - Endarterectomy
Nursing Process
- Peri-operative
  - Knowledge /teaching
  - Anxiety
  - Pain
- Post operative
  - Pain
  - Airway / Gas exchange
  - Decreased Cardiac output
  - Infection
  - Hemorrhage
  - Tissue Perfusion
  - GI
- Rehabilitative

Other considerations
- Nutrition
- Pharmacology
- Gerontologic

Hypertension
Chapter 33
- Hypertensive Disease
  - Essential
  - Secondary
  - Accelerated
  - Malignant
What is hypertension

Blood pressure is the force put on the arterial walls by the blood
• Sustained elevation of the systolic or diastolic that exceed prehypertension
  – 120 to 139 systolic
  – 80 to 89 diastolic
  – Are considered prehypertension
  – Stage 1 - 140 to 150/90 to 99
  – Stage 2 – 160 or greater /100 or greater

Causes

• Essential
  – Unknown
    • age
    • Race
    • Lifestyle
    • Electrolyte and chemical balance

• Secondary
  – Accompanies or is secondary to another disorder
    • Volume or renal function relating to vasoconstriction
    • Predisposing conditions
Organs effected by hypertension

- Cerebral
- Eyes
- Cardiac
- Renal
- Vascular

Chronic high blood pressure (hypertension) left untreated can lead to:

- Blood vessel damage (atherosclerosis)
- Heart attack or heart failure
- Kidney failure

Normal heart

Hypertensive heart

Thickening in walls of ventricles

Right ureter

Cross-section

Right kidney

Bumpy surface caused by hypertension
How exhibited

• Unseen in many cases
  – asymptomatic
  – “Silent Killer”
  – Dx made during routine exam or if complications occurring.
• Physical assessment cues
  – Elevation of B/P
  – Bounding pulse
  – Weight
  – Flushed face
  – Edema

Diagnostic test

• Repeated elevation of B/P three times
• Rest of test are to determine extent of damage caused by disease
  ECG
  Echo
  CT
  X-Ray
  Lab
  if renal or vascular

Medical treatment

• Goal is to lower B/P & minimize or prevent complications
  – Non-pharmacological – a.k.a. lifestyle changes
    • Diet
    • Weight
    • Smoking
    • Exercise
  – Pharmacological
    • Single
    • Layering
  – Treatment of causative disease if secondary hypertension
Accelerated and Malignant Hypertension

- More serious
- Abrupt onset
- One leads to the other
- Found in previously undiagnosed
- Lack follow-up
- Poor compliance
- Fatal if untreated

Medical Management

- Reduce Blood Pressure
  - Oral drugs if not critical
  - Oxygen
- Hypertensive emergency
  - IV Drugs
Nursing Concerns

• Knowledge
  – Disease
  – Diet
  – Drugs
  • Antihypertensives
    – Diuretics
    – Calcium Channel blockers
    – ACE I
    – Beta Blockers
    – Alpha Blockers
    – Alpha – Beta Blockers
    – Beta Blockers

Nursing Concerns

• Safety issues
  – hypotension
• Gerontological
  – Monitor and see M.D.
  – Increased risk hypotension
  – Increased risk hypokalemia r/t diuretics

Heart Failure (HF)
formerly
Congestive Heart Failure (CHF)
Chapter 34

• Heart Failure
  – Types
    • Acute
    • Chronic
    • Left-sided
    • Right-sided
What is Heart Failure?

• Insufficient blood is pumped to meet needs of body

Acute vs Chronic

Sudden vs gradual
Life Threatening vs Compromise

• Right sided vs Left sided
  – Systemic vs pulmonary
  – Right ventricle failure vs left ventricular failure

How do we determine HF?

• Symptoms
• Lab
  – Lytes
  – BNP
  – ABG’s
• X-ray
  – Chest
• Echo
• Nuclear Med
• Angiography
S & S

• Left
  – Fatigue
  – Resp. distress
    • Wet lung sounds
    • Productive cough

• Right
  – Weak
  – Weight gain
    • Edema
    • Ascites
    • Neck vein distention

Cor pulmonale, or right-sided heart failure, is an enlargement of the right ventricle due to high blood pressure in the lungs usually caused by chronic lung disease.

Heart Failure

- Pulmonary artery
- Left atrium
- Right atrium
- Inferior vena cava
- Superior vena cava
- Left ventricle
- Right ventricle
- Papillary muscle
- Mitral valve
- Tricuspid valve
- Aortic valve
- Pulmonary valve
- Left atrium
- Right atrium
- Inferior vena cava
- Superior vena cava
- Left ventricle
- Right ventricle
- Papillary muscle
- Mitral valve
- Tricuspid valve
- Aortic valve
- Pulmonary valve
Medical Treatment

- Reduce Workload
- Improve cardiac output
  - Drugs
  - Mechanical Support
  - Surgical

Nursing Management

- Education
  - Drugs
  - Lifestyle
  - Support
- Assessment
  - V/S
  - I&O and Weight
  - Lung and Heart Sounds
- Monitor
  - As above

Pulmonary Edema – Acute Heart Failure

Fluid accumulation interferes with gas exchange at the alveoli
Acute emergency
Often complication of Left side heart failure
Causes other complications
What happens

• Left ventricle incapable of sufficient function
• Right ventricle still works well
• Fluid build up in the lungs
• Gas exchange impaired
• Symptoms develop

Treatment

• Relieve pulmonary congestion quickly before fatal
  – Drugs
  – Oxygenation
    • Mask
    • CPAP
    • Mechanical Ventilation
• Nurse’s Role
  – Monitor
  – Support

Nutritional

• Severe
  – Fluid Restriction
  – Sodium Restriction
• Mild
  – Sodium Restriction decreased
• Weight Loss
• Several Small feedings
Pharmacological

- Diuretics
- Antihypertensives
  - ACE Inhibitors
- Cardioglycosides
- Electrolyte Support
- Respiratory Support

Gerontologic

- Dyspnea
- Mental Status changes
- Age related changes increase risk
  - Physically
  - Pharmacologically
  - Financially